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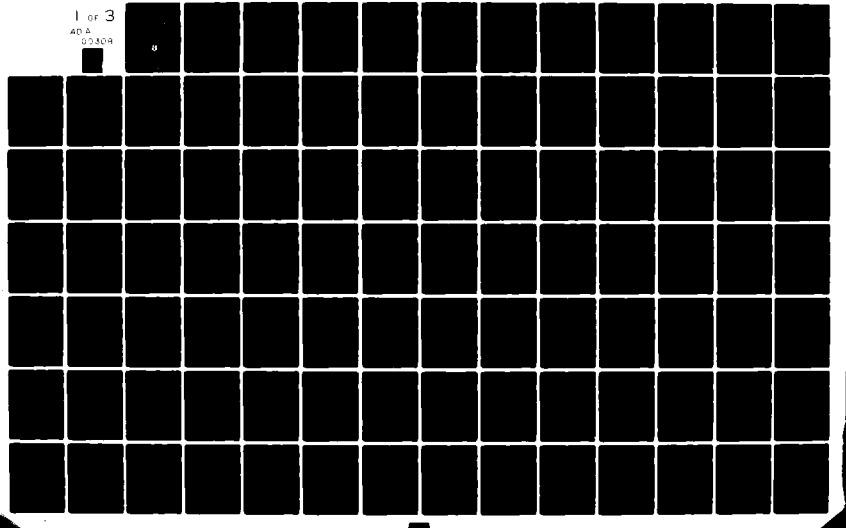

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DEB TYPE I RECONSTITUTION PACKAGE DEPLOYMENT MANUAL (RPDM)

BY ORVIN H. BRENDEN

MAY 1981

Prepared for

DEPUTY FOR COMMUNICATIONS AND INFORMATION SYSTEMS
ELECTRONIC SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
Hanscom Air Force Base, Massachusetts

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REVIEW AND APPROVAL

This technical report has been reviewed and is approved for publication.

John J. Coco GS-13
JOHN J. COCO, GS-13
Project Engineer

Guy M. Harn GS-12
GUY M. HARN, GS-12
Project Engineer

FOR THE COMMANDER

John E. Meyn, MAJOR, USAF
JOHN E. MEYN, Major, USAF
DEB Program Manager
Deputy for Communications and Information Systems

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Transportable digital communications systems, called Reconstitution Packages, have been developed for use in the Digital European Backbone (DEB) Stage I segment of the terrestrial Defense Communications System (DCS). The Reconstitution Packages will provide a means for rapid restoration of critical communications in the event of catastrophic failure of any station in the network. The Reconstitution Package Deployment Manual (RPDM) describes the Reconstitution Packages, provides guidelines,

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for configuring the Reconstitution Packages to emulate any DEB I site, and gives detailed initial operating instructions. In addition, this RPDM describes methods of utilizing the Reconstitution Packages to provide access to DEB by tactical forces.

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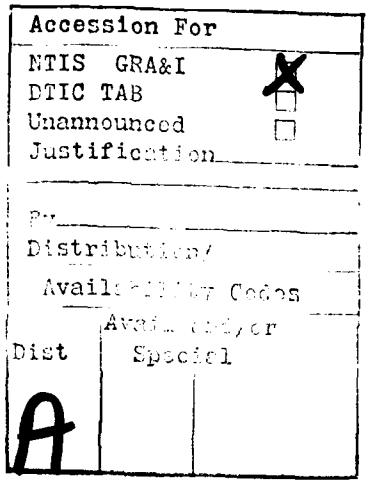

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1.0 INTRODUCTION

The Digital European Backbone (DEB) Terrestrial Transmission Upgrade Project, Stage I, a mainline segment of the European Defense Communication System (DCS), consists of thirteen line-of-sight (LOS) microwave sites extending from Coltano, in Italy, to Vaihingen, in the Federal Republic of Germany, with a transverse segment to Vicenza and Aviano, Italy (Figure 1). Reconstitution packages (Type I and Type I A) have been developed to provide a means of temporarily restoring critical communications, should any DEB I station become disabled, until the site can be permanently reworked. The reconstitution packages can also be used to temporarily extend the DCS into areas where communications facilities do not exist. They will be deployed by specially trained reconstitution teams.

This deployment manual is considered to be required reading for every member (or potential member) of a reconstitution team. It is intended to serve as a guide to aid in rapid reconstitution of each DEB Stage I site. The manual includes: detailed descriptions of the reconstitution packages, system configuration options, instructions for configuring the packages at each DEB I site, operating instructions for each reconstitution package component, and component and system data needed for deployment planning. The manual has been organized to present basic information that can be easily referenced, to assist a reconstitution team in choosing a reconstitution package configuration to fit almost any emergency situation. Each DEB I site is unique, hence, a set of detailed reconstitution instructions, tailored to fit every possible scenario, is not feasible. The reconstitution team must therefore be well trained and capable of adapting to variations of the scenarios described herein.

Brief descriptions of major equipment and detailed operating procedures are included for reference purposes and to assist the reconstitution team in initial set-up. The information contained herein is, with the exception of radio operation, not as detailed or encompassing, as equipment manuals or technical orders. (The manufacturer's radio manual is written to cover the many versions of the TCM-604B manufactured by TerraCom. Operating instructions contained in this reconstitution manual are the only existing instructions tailored to the particular version of TCM-604B radio supplied with the DEB Type I and I A reconstitution packages.) A technical manual or manufacturer's manual for each applicable major component is included with the equipment shelter, generators, and Type I A manpack. Those reference manuals are essential for operation and maintenance of the reconstitution packages; they must be retained in their respective storage locations.

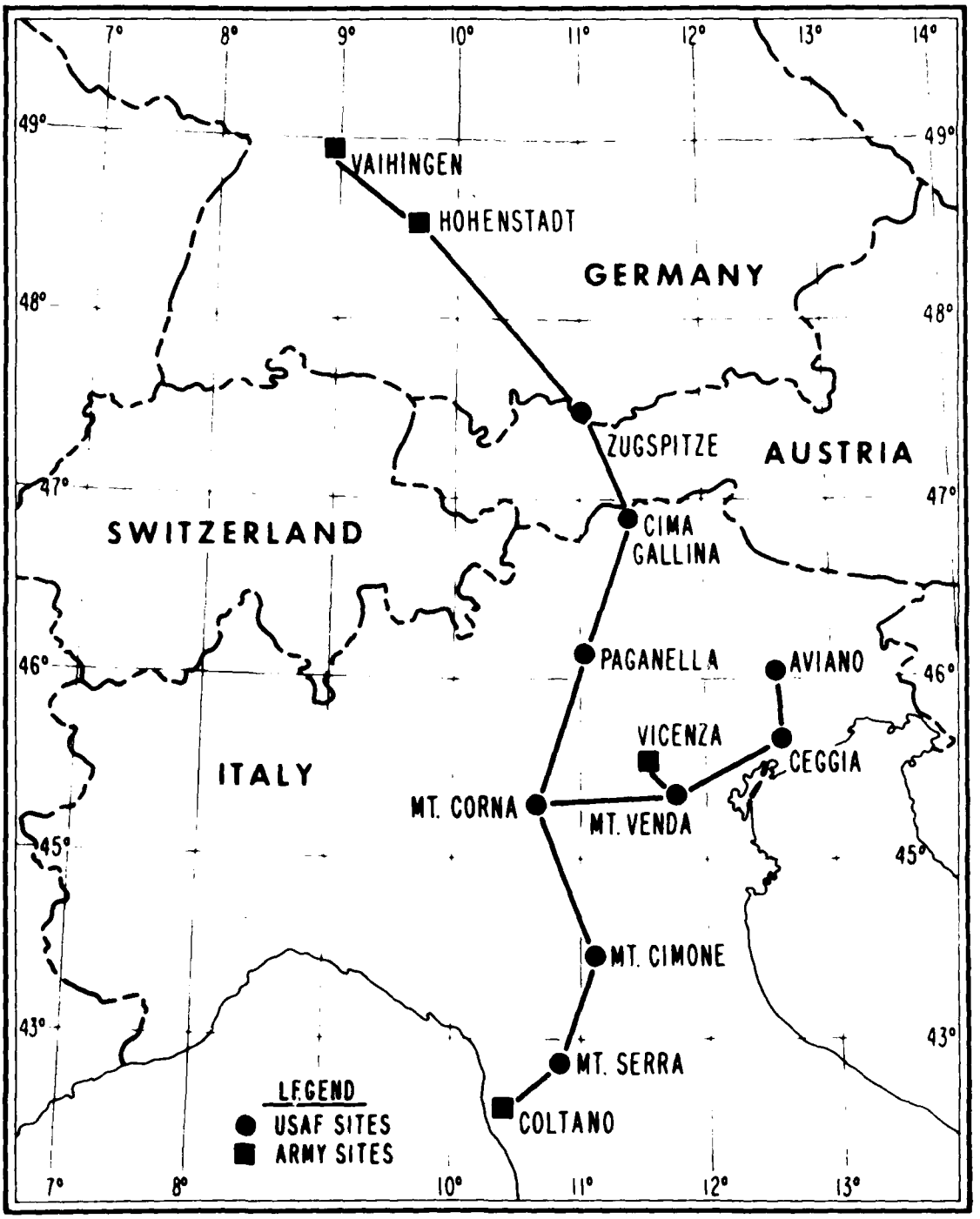

Figure 1. DEB Stage I

This manual assumes that the responsible organizations will have prepared detailed reconstitution plans for each station. In the event that those plans are not completed, this volume should help serve as a guide for the preparation of them. Detailed planning for equipment transportation, maintenance activities, schedules and team assignments are examples of subjects that they should contain. The following must also be included:

o Generator fuel supply instructions - Most DEB I sites have supplies of diesel fuel and, if it is planned to use those sources during reconstitution, a method of extracting the fuel from the tanks, most of which are underground, must be provided and described. Alternatively, if a supply of fuel accompanies the generators to the site, transportation, and resupply must be considered. (Note: The generators that accompany the Type I A package require gasoline, which must therefore be transported to the remote sites at which the Type I A package is to be deployed.)

o Site preparation -

Mast/Antenna Subsystem (MAS). Guy anchors should be prepositioned and a level area prepared for the mast baseplate at Vicenza, Aviano, Ceggia, Mt. Corna, Coltano, Hohenstadt, Vaihingen, and Mt. Serra.

Pipes for the Type I A Antennas. Pipes should be permanently installed at mountaintop sites (Zugspitze, Cima Gallina, Paganella, and Mt. Cimone) to support the Type I A antenna pipemounts.

Prime Power. Access to station (or commercial) 120 volt 50/60 Hz single phase primary power (1 kW) should be provided at weatherproofed duplex connectors outside the site building at mountaintop sites. At the other sites, 12 kW of 120/208 3-phase power is required.

The Type I reconstitution package has the ability to restore station primary power. A method of interconnection between the the Type I generators and the station is needed. A weatherproofed connector should be installed on the communication building and wired to a switch that will allow the station load to be transfered from the station generators to an outside power source. This requirement is not applicable to mountaintop sites, since a means to restore site power is not provided.

o Special arrangements - Negotiations should be conducted to obtain permission for temporary access to properties outside of the sites, where needed. The reconstitution plan should outline points of contact with host organizations, to aid in obtaining their cooperation during a reconstitution effort.

o Voice frequency channelization plans - Since voice frequency channel connections will change, a periodic update of VF channelization routing plans must be provided to the reconstitution teams, for each site having voice frequency breakouts.

o Circuit priorities - In cases where the reconstitution packages cannot restore all operational circuits, reconstitution teams will require detailed circuit routing priorities.

o Frequencies - Where it is necessary to establish a simple repeater to restore link connectivity, emergency frequencies will be needed (e.g., Hohenstadt to Vaihingen).

1.1 Configuration Definitions

For the purposes of this document, the following DEB I site configuration definitions will apply. Although each site presents a unique set of reconstitution conditions, the sites can be grouped into two categories:

(1) Terminals - Sites whose primary function is voice frequency (VF) channel breakout. Terminal sites are located at Vaihingen, Aviano, Vicenza, Coltano, and Hohenstadt.

(2) Repeaters - Sites that function primarily as regenerative repeaters. Repeater sites can be further subdivided into simple and branching repeaters. Accessible simple repeater sites are at Ceggia and Mt. Serra. Less accessible simple repeater sites are at Mt. Cimone, Paganella, Cima Gallina, and Zugspitze. Accessible branching three-way repeater sites are at Mt. Corna and Mt. Venda.

1.2 Reconstitution Packages

Two types of reconstitution packages have been developed, Type I and I A. The military nomenclature for the Type I system is AN/GSC-48 (Communication System, Digital Microwave). A Type I Reconstitution Package can restore any DEB I site, except a three-way repeater. It is limited to a maximum of 96 VF channels at a terminal. Some repeater sites in DEB I are located atop high mountains, with limited means of access (cablecars or chairlifts).

Restoration of those sites is made possible by a manpack version of the reconstitution package (Type I A). The military nomenclature for the Type I A system is AN/GSC-47 (Communication System, Digital Microwave, Portable Manpack). The Type I A system is specifically configured to restore a simple repeater and does not require multiplexers for that purpose. In order to provide maximum flexibility, and to allow tactical users access to the DCS at repeater sites, transportable second level multiplexers have also been included as part of the Type I A system. Type I and Type I A reconstitution packages, deployed in combination, can restore a three-way repeater. The reconstitution packages are not configured for unattended operation.

1.2.1 Type I Reconstitution Package (AN/GSC-48)

The Type I Reconstitution Package consists of an S-280 equipment shelter, a mast/antenna subsystem (MAS), and two PU-405 A/M primary power generators. Figure 2 is a block diagram of a Type I Reconstitution Package.

1.2.1.1 Equipment Shelter. The equipment shelter consists of an assembly of several, physically discrete, electrically interconnected components, mounted in an S-280 shelter to comprise an integrated system. It feeds two, full-duplex, multi-channel microwave radio communications links operating in the 7.7 to 8.4 GHz frequency band and utilizing the LOS propagation mode. Figures 3, 4, and 5 are the shelter floor plan and cross sections of curbside and roadside views, respectively.

The equipment shelter provides, as a minimum, the following major operational functions:

(1) The ability to function as a full-duplex microwave radio repeater with a capacity of up to eight digital groups (digroups) (Figure 6). Each digroup is a 1.544 Mb/s binary data stream consisting of 24 time division multiplexed channels.

(2) The same repeating ability with a "drop-and-insert" capability for up to 96 full-duplex VF circuits, 48 channels (two digroups) broken out in each direction. Provisions can be made for manually interconnecting (patching) the T1 lines of the two second-level multiplexers in all possible combinations. An example of a single T1 line of a second-level multiplexer, which has been manually selected for use in a 48 channel breakout "drop-and-insert" configuration, is shown in Figure 7.

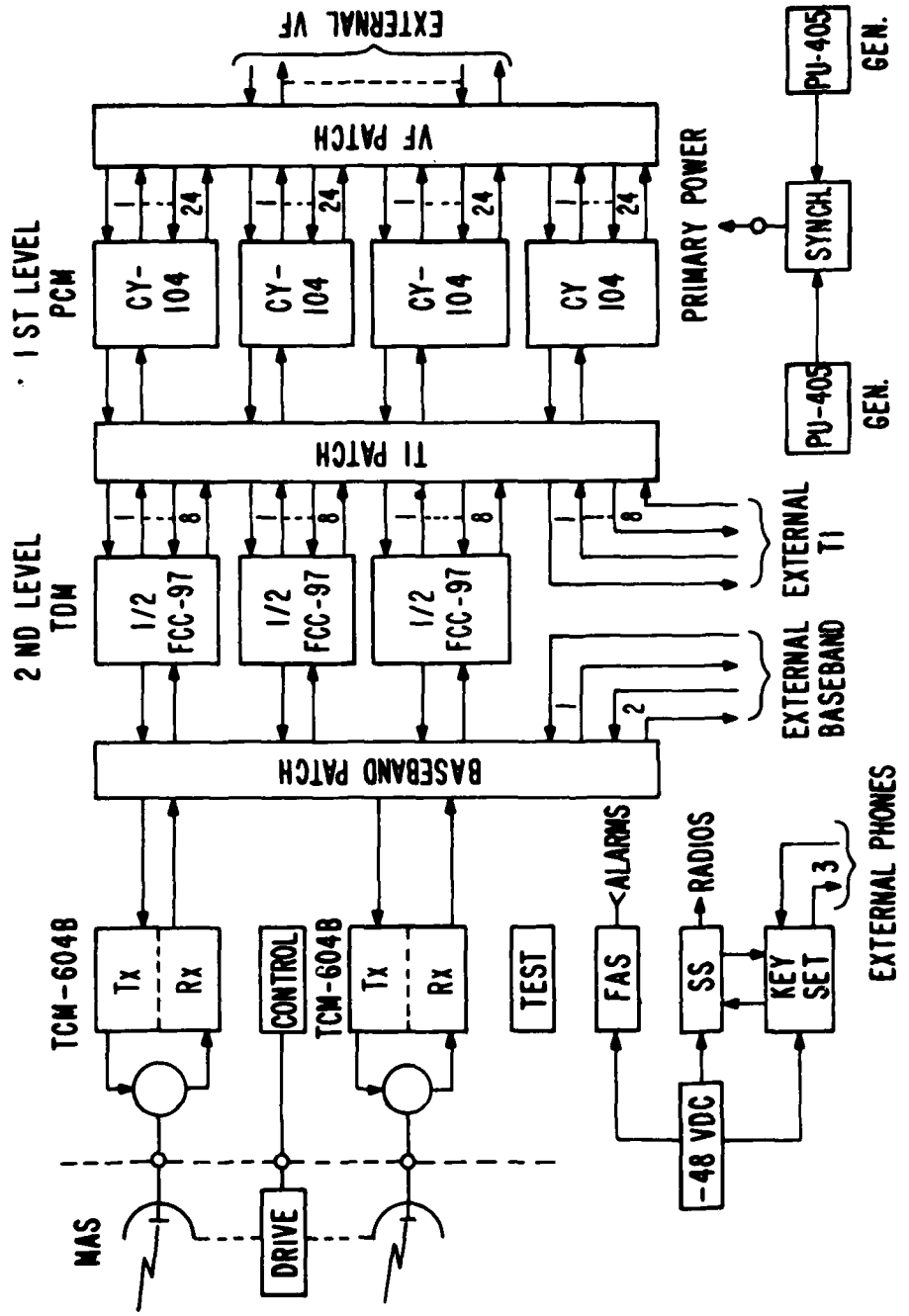

Figure 2. Type I Reconstitution Package

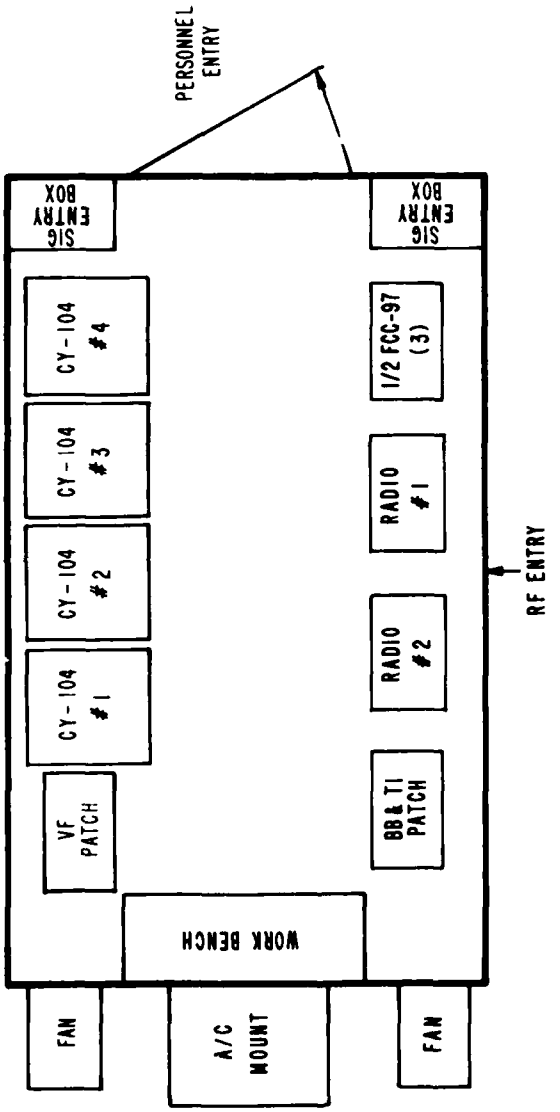

Figure 3. Equipment Shelter Floor Plan

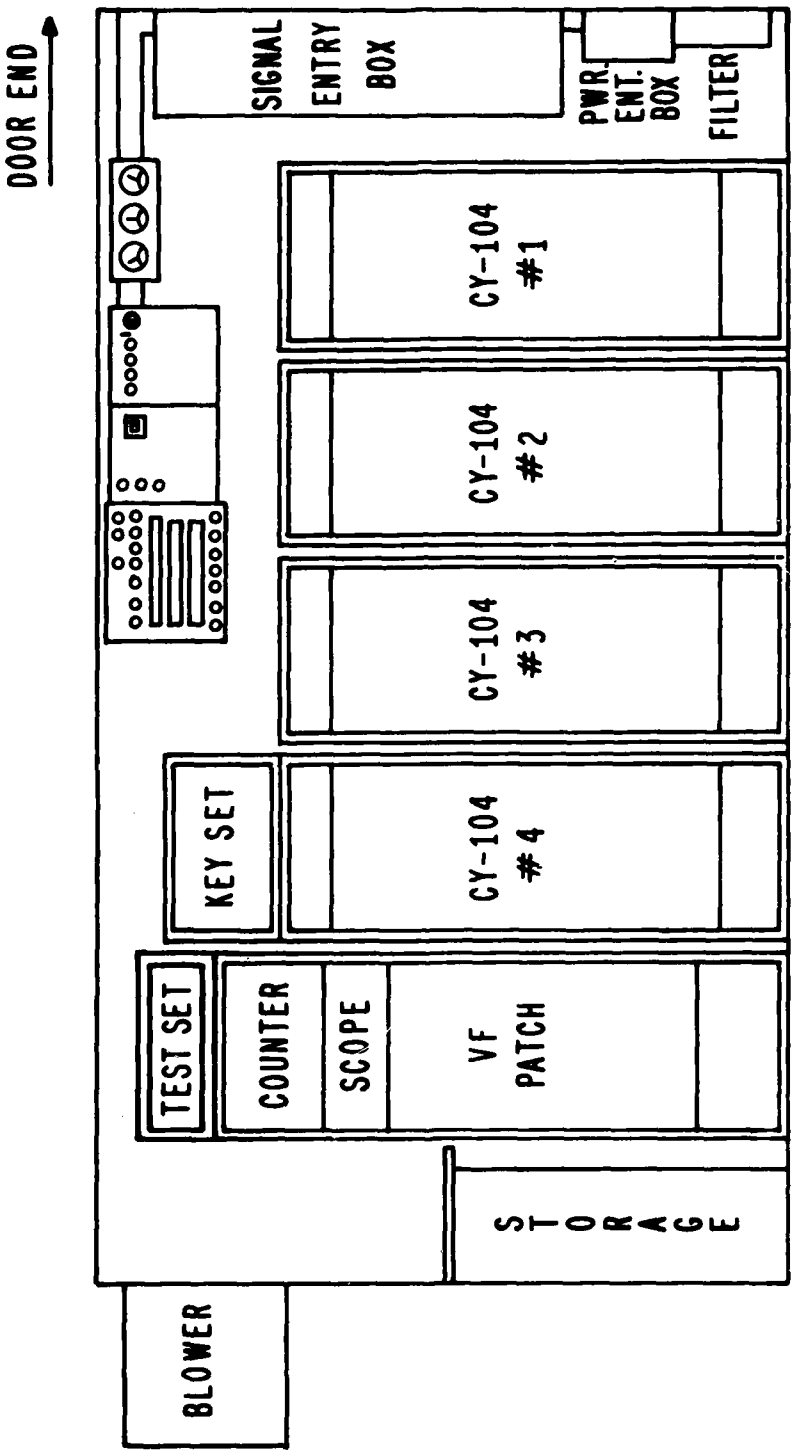

Figure 4 Equipment Shelter Curbside Cross-section

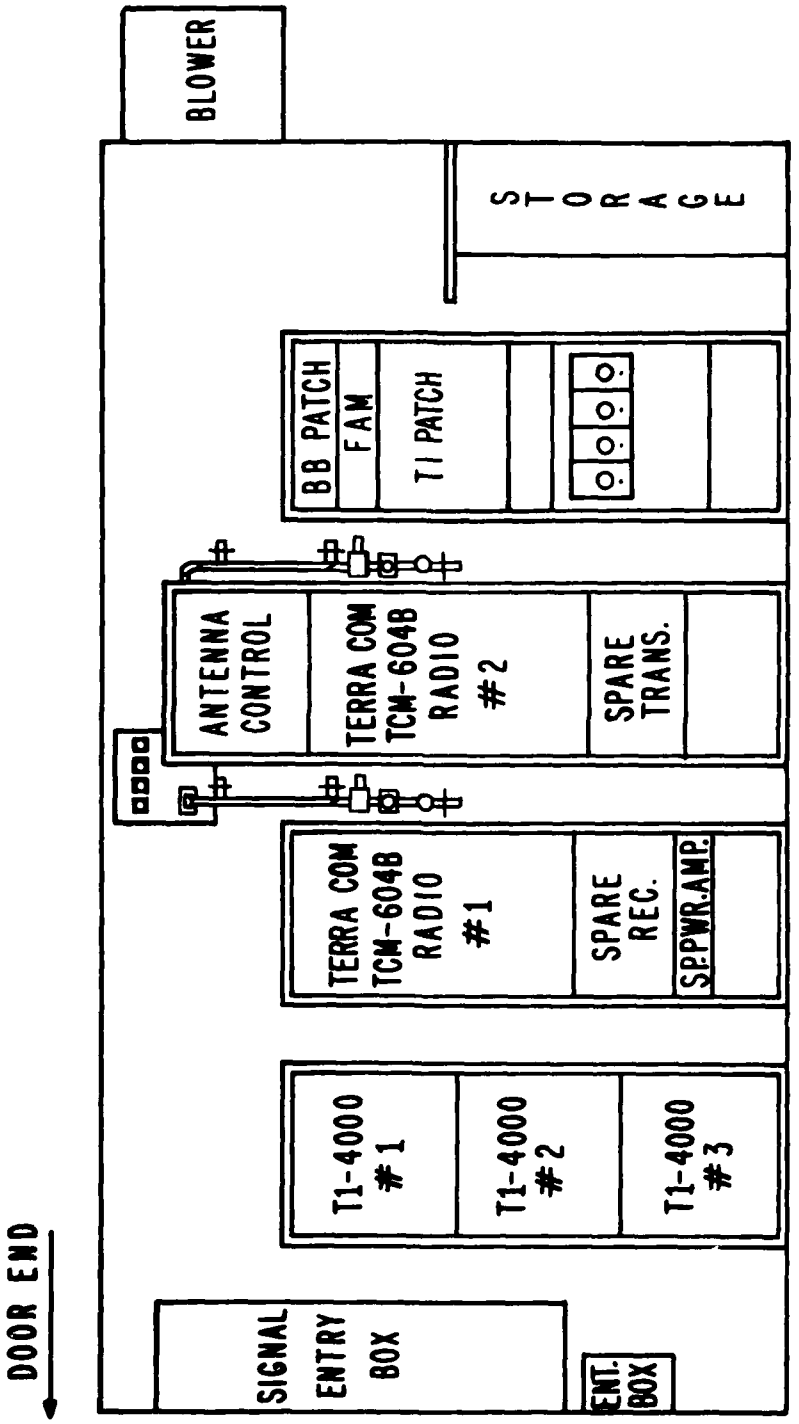

Figure 5. Equipment Shelter Roadside Cross-section

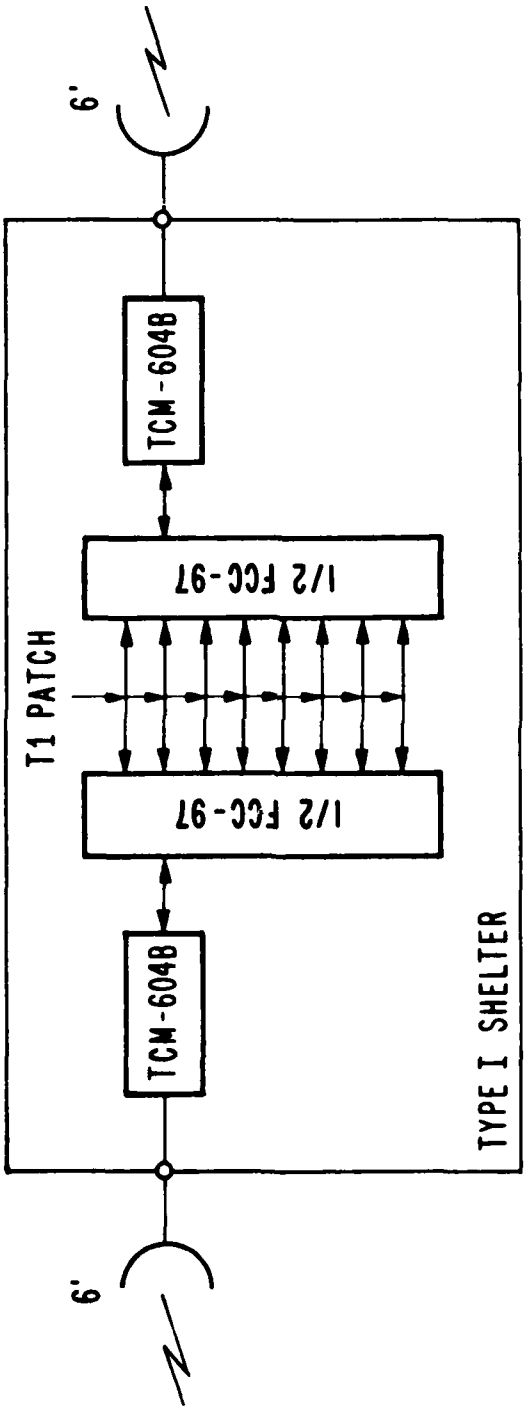

Figure 6. Microwave Repeater

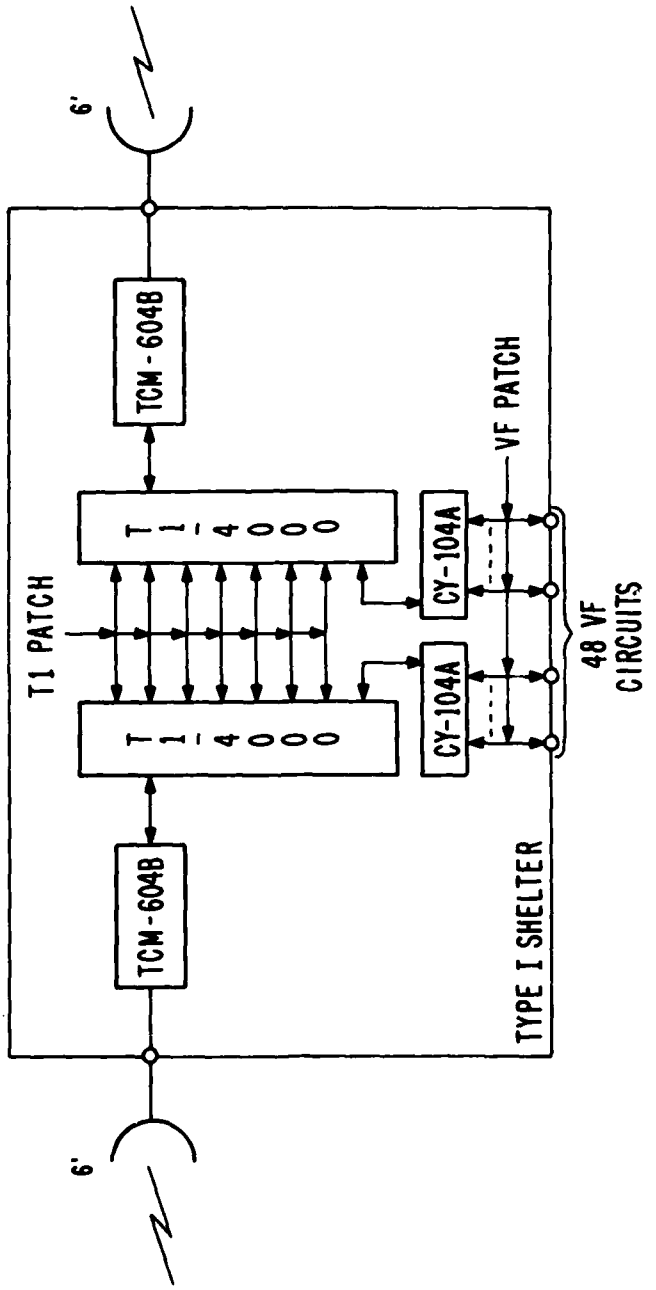

Figure 7. Drop and Insert Microwave Repeater

(3) The ability to function as a terminal, with provisions for interfacing, on a 4-wire basis, with up to 96 VF circuits (Figure 8).

In addition to those operations, the Type I configuration provides access to the DEB Stage I orderwire and fault alarm circuits. It functions as a through repeater for those channels.

The equipment shelter operates on 3-phase, 4-wire, 120/208 VAC. Maximum power consumption is approximately 11.5 kW.

The shelter contains the following major components in the indicated quantities:

QUANTITY	COMPONENT
2	Microwave Radio (TerraCom TCM-604B)
3	Time-Division Multiplexer (1/2 FCC-97)
4	Multiplexer/Cryptographic Set (CY-104A)
1	Patch & Test Facility
1	Supervisory Subsystem

1.2.1.1.1 Microwave Radio. The radio was selected from the TerraCom TCM-600 series of microwave radio equipment. The TCM-600 series is a family of solid state, wideband microwave radios featuring light weight, frequency agility, modular construction, built-in test equipment, operational monitoring, and failure analysis aids.

Each of the two radio components in the equipment shelter comprises the following major subcomponents:

(a) TCM-604B Transmitter

(b) TCM-604B Receiver

(c) Waveguide Assembly

(d) 1177H02 TWT Power Amplifier

(e) TCM-6RK-1 Transmit and Receive Remote Kits

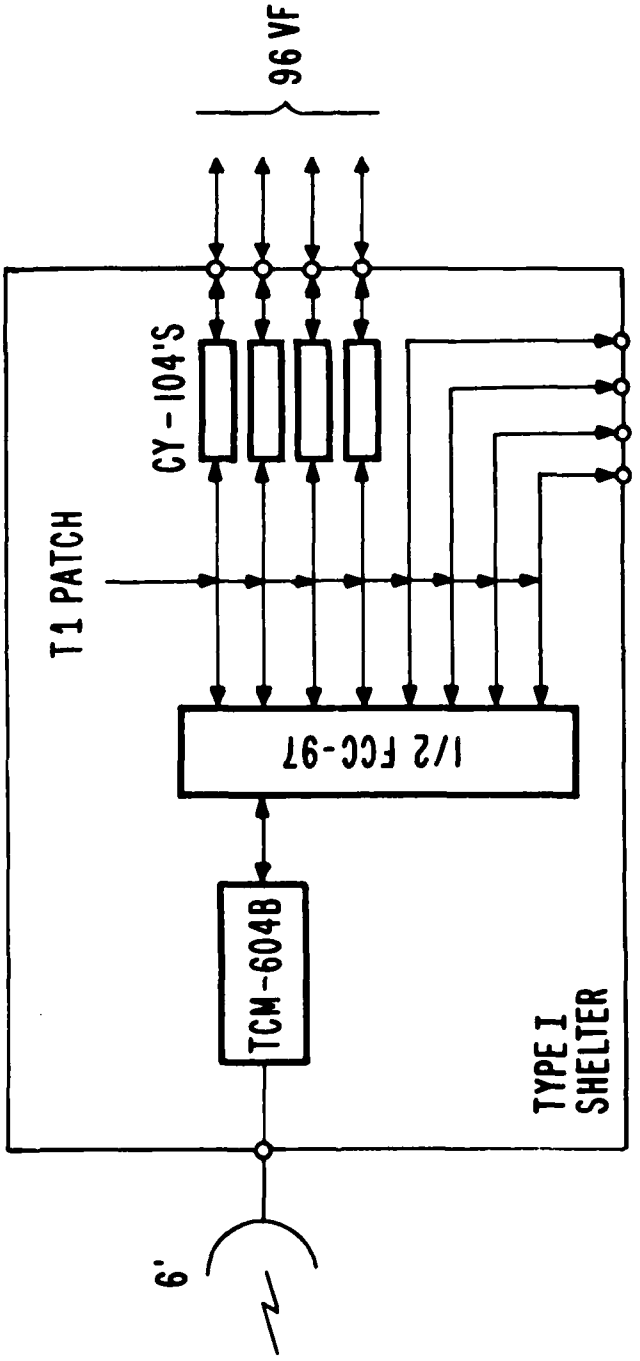

Figure 8. Terminal

(f) TCM-6CIR Coaxial Circulator

(g) TCM-SSPH Solid State Power Amplifier

1.2.1.1.1(a) Transmitter. The transmitter provides continuous tuning in the band 7.7 to 8.4 GHz, at a minimum RF power output of 0.5 watt. Each transmitter is equipped with the following functional modules:

Power Supply Unit

Control/Monitor Unit

Baseband/Audio Unit

AFC Unit

Synthesizer Unit

RF Head

1.2.1.1.1(b) Receiver. The receiver provides continuous tuning in the band 7.7 to 8.4 GHz. Each receiver is equipped with the following functional modules:

Power Supply Unit

Control/Monitor Unit

Baseband/Audio Unit

AFC Unit

IF/Demodulator Unit

RF Head

1.2.1.1.1(c) Waveguide Assembly. The waveguide assembly provides the capability to vary the transmitted output power, operate both the receiver and transmitter from a single transmission line, and to measure transmitted output power and voltage standing wave ratio (VSWR) of the tranmission line. Each waveguide assembly is equipped with the following functional components:

Circulator (TCM-CIR)

Variable Attenuator (Systron-Donner DBH-430)

Waveguide Switch (Systron-Donner DBH-612A1)

Directional Coupler (Omega 337)

90 Degree Twist

Six Waveguide to Coax Adapters

1.2.1.1.1(d) TWT Power Amplifier. The power amplifier utilizes a periodic permanent magnetic focused travelling-wave tube, a solid state regulated power supply, and an integral cooling system. The amplifier will put out a minimum of 10 watts over a 4.0 to 10.5 GHz frequency range. The gain of each individual unit will vary (total gain greater than 30 dB). A variable attenuator in the waveguide assembly makes it possible to adjust input power while observing TWT output with a power meter and directional coupler. The capability of controlling the TWT drive level is needed to prevent damaging the amplifier and to conform with host country regulations concerning radiated power levels.

1.2.1.1.1(e) Remote Kits. A weatherproof box and replacement panel, called a remote kit, is provided for each receiver and each transmitter. The remote kits provide a capability to position the receiver and transmitter RF sections near the antenna or at some other location convenient to the appropriate RF transmission line. Included with the remote kits are coaxial cables to interconnect the kits with the receiver and transmitter and a 2-watt solid state amplifier (TCM-SSPH), mounted in the cover of each transmitter remote kit. To assist in coordinating transmitter and receiver alignment procedures, a telephone system is furnished for communication between the equipment shelter and tower mounted remote kits.

Within the Type I shelter, two remote kit enclosures (boxes) are located to the right of each radio, secured by floor mounted brackets. Remote kit replacement panels are stored in the equipment rack at the right of radio #2, under the T1 patch panel.

1.2.1.1.1(f) Coaxial Circulator. A three-port coaxial circulator is associated with each transmitter/receiver pair. The circulator allows utilization of a single transmission line and antenna for both transmit and receive signals, by providing necessary isolation between the transmitter and receiver when the transmitter and receiver RF heads are remoted (See 1.2.1.1.1(e).).

1.2.1.1.1(g) Solid State Amplifier. The TerraCom TCM-SSPH solid state amplifier provides a nominal two-watt output across the band

7.7 to 8.4 GHz, when driven by the output of the transmitter RF head (6 dB gain). The amplifier, together with its power supply, is mounted in the cover for the remote kit box.

1.2.1.1.1(h) Additional Features. Several options are available with the TerraCom TCM-604B radios. In order to satisfy the specific functional requirements of the reconstitution package, each radio set is equipped with the following options:

(1) Digital Synthesizer - The type TCM-6DSO digital synthesizer determines the radio transmitter output frequency. The transmit frequency is derived from a single crystal oscillator and selected by thumbwheel switches.

(2) FM Subcarrier Channel - The type PC-2 subcarrier channel is composed of a modulator and demodulator circuit with a primary carrier selected between 4.8 MHz and 14 MHz. Normal input/output impedance is 600 ohms, balanced. 10 dB attenuators are supplied, both at the input to the transmitter and at the output of the receiver.

(3) Subcarrier Notch Filters - Type PCNF-2 subcarrier notch filters are required when the type TCM-6LPF Butterworth low-pass filter is used.

(4) Low-Pass Filter - The type TCM-6LPF (Butterworth) baseband filter is required to insure that the out-of-band noise is minimized. This filter is factory adjusted according to system baseband bandwidth requirements. Notch filters are required for the FM subcarrier channels.

(5) Test-Tone Circuit - The type TCM-6TT test-tone circuit is composed of a 2.6 kHz test-tone generator in the transmitter and a speaker with an amplifier in the receiver. This circuit is used in antenna path alignment and for end-to-end performance tests of both baseband and subcarrier channels. The test tone is used with the TCM-60M off-air monitor, in performing deviation tests on both transmitter and receiver.

(6) Off-Air Monitor - The type TCM-60M off-air monitor is located in the AFC unit of the transmitter. This circuit samples the RF output on a rear panel connector. Together with the TCM-6TT test-tone circuit, the off-air monitor provides built-in deviation testing of baseband and subcarrier channels.

(7) Tunable Preselector - The type TCM-6TP tunable preselector provides continuous front panel tuning of the

receiver RF input filter over the frequency range of the tunable receiver local oscillator. A precalibrated dial permits direct setting of carrier frequencies within about 2 MHz. The 3 dB points of the filter are at approximately plus or minus 20 MHz.

(8) Remote Fail Relay - Each transmitter and receiver is equipped with the type TCM-6RFR remote fail relay option to enable remote monitoring of failures in the radio set. This option provides dry-reed-contact outputs at a rear panel connector, allowing fault isolation light indications to be displayed remotely.

(9) Repeater Switch - The type TCM-6RO repeater operation switch allows frequency shaping elements in the transmitter and receiver to be bypassed when the test tone/repeater switch is set to REP. A strap attenuator in the transmitter and a bridging baseband amplifier in the receiver are used to produce the proper interface levels.

(10) Bandpass Filter - The transmitted spectrum of each TWT power amplifier must be restricted by use of a tunable filter. The TerraCom TCM-6TPR preselector filter (tunable) is used for this purpose. The bandpass filters are mounted on separate rack panels.

1.2.1.1.1(i) Maintenance Philosophy. The modular construction of the TerraCom TCM-604B radio set permits the rapid replacement of a faulty circuit with a minimum of down time, a few minutes being typical. This feature allows a maintenance scheme based on module sparing and replacement, rather than on redundancy in the radio component.

The built-in test equipment (BITE) allows operational levels to be checked and/or adjusted, without the use of external test equipment. This feature significantly reduces the array of ancillary test equipment that might otherwise be needed for routine operation and maintenance of the equipment.

Operational monitoring is available through the use of detected voltage levels, displayed on an internal monitor meter to provide a visual indication of component operation. Failure analysis is accomplished through the use of the built-in test equipment and the fault lights located in the individual modules of the transmitter and receiver.

This approach to routine maintenance is implemented by the provision of one complete set of transmitter and receiver modules, plus one spare TWT power amplifier. Spare (unwired) enclosures are rack-mounted to provide storage for the spare modules. The spare TWT power amplifier is rack-mounted for convenient use as a replacement.

1.2.1.1.1(j) Optional Radio Configurations. To afford the maximum flexibility in deployment situations, the following radio configurations are available as options:

Option 1 - Receiver and transmitter RF head modules are mounted in the shelter, connected to the waveguide assembly by coaxial cables. The RF transmission line to each antenna is a single rectangular waveguide. Transmitted output power is 0.5 watt minimum (0.9 watt maximum). (See Figure 9.)

Option 2 - Receiver and transmitter RF head modules are mounted, together with coaxial circulator, at the antenna. Connections to the shelter RF entry panel are by special remoting cables (Figure 9). Transmitted output power is 0.5 watt minimum (0.9 watt maximum).

Option 3 - Receiver and transmitter RF head modules are mounted in the shelter. Transmitter RF output is attenuated and connected to the TWT power amplifier. The amplifier output is connected to the waveguide assembly by coaxial cable. The RF transmission line to each antenna is a single rectangular waveguide. (See Figure 10.) Transmitted output is adjustable, up to a maximum of 5 watts.

Option 4 - Receiver and transmitter RF head modules are mounted, together with a coaxial circulator and a 2-watt solid state amplifier, at the antenna. Connections to the shelter RF entry panel are by special remoting cables (Figure 10). Transmitter RF head output is connected to the circulator through the solid state amplifier. Transmitted output power is nominally 2 watts.

1.2.1.1.2 Time Division Multiplexer. The second-level time division multiplexer is designed to combine eight T1 lines (digroups) into a single 12.6 Mb/s composite message signal. This equipment also includes the modems to convert the 12.6 Mb/s digital signal into a quasi-analog partial response signal for transmission over the analog radios. These Type I Reconstitution Package func-

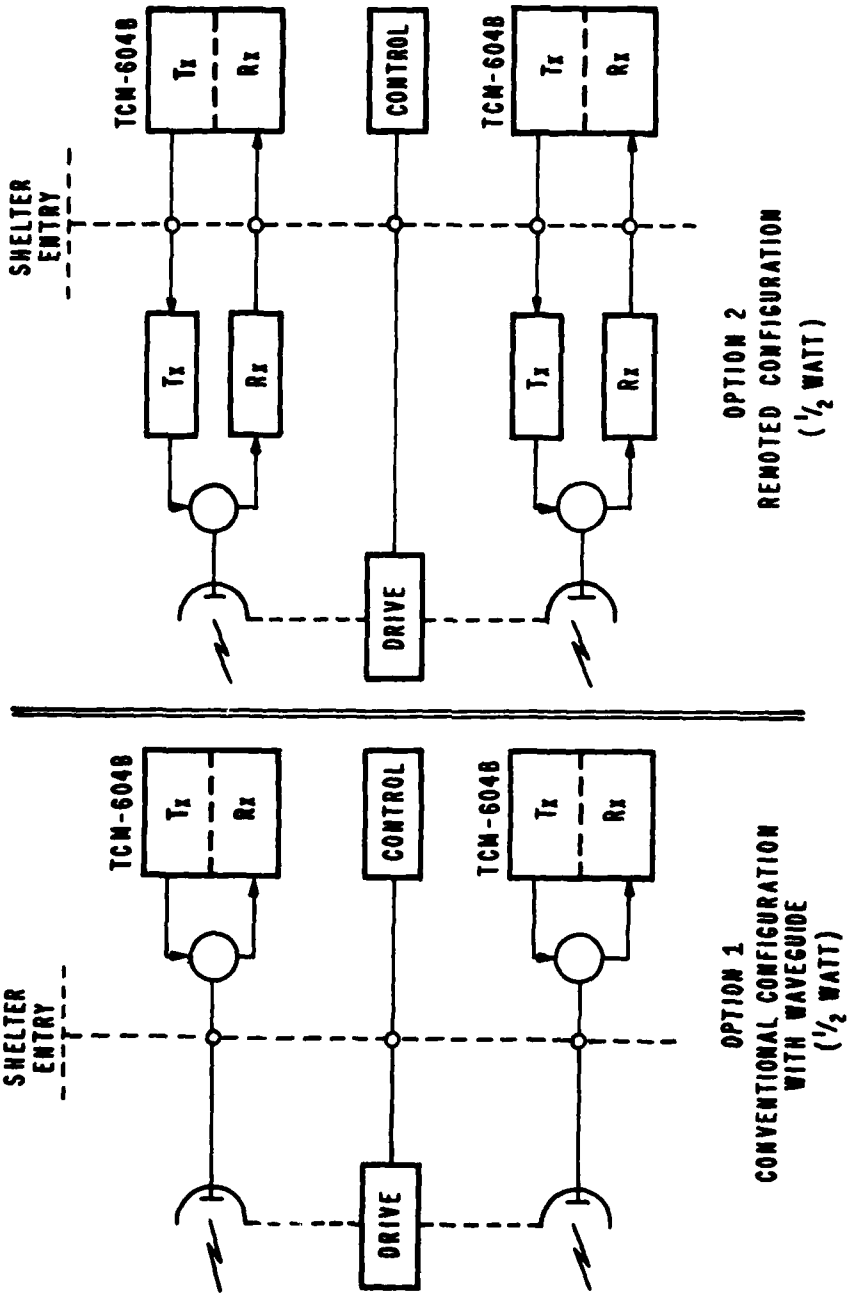

Figure 9. Optional Radio Configurations 1 & 2

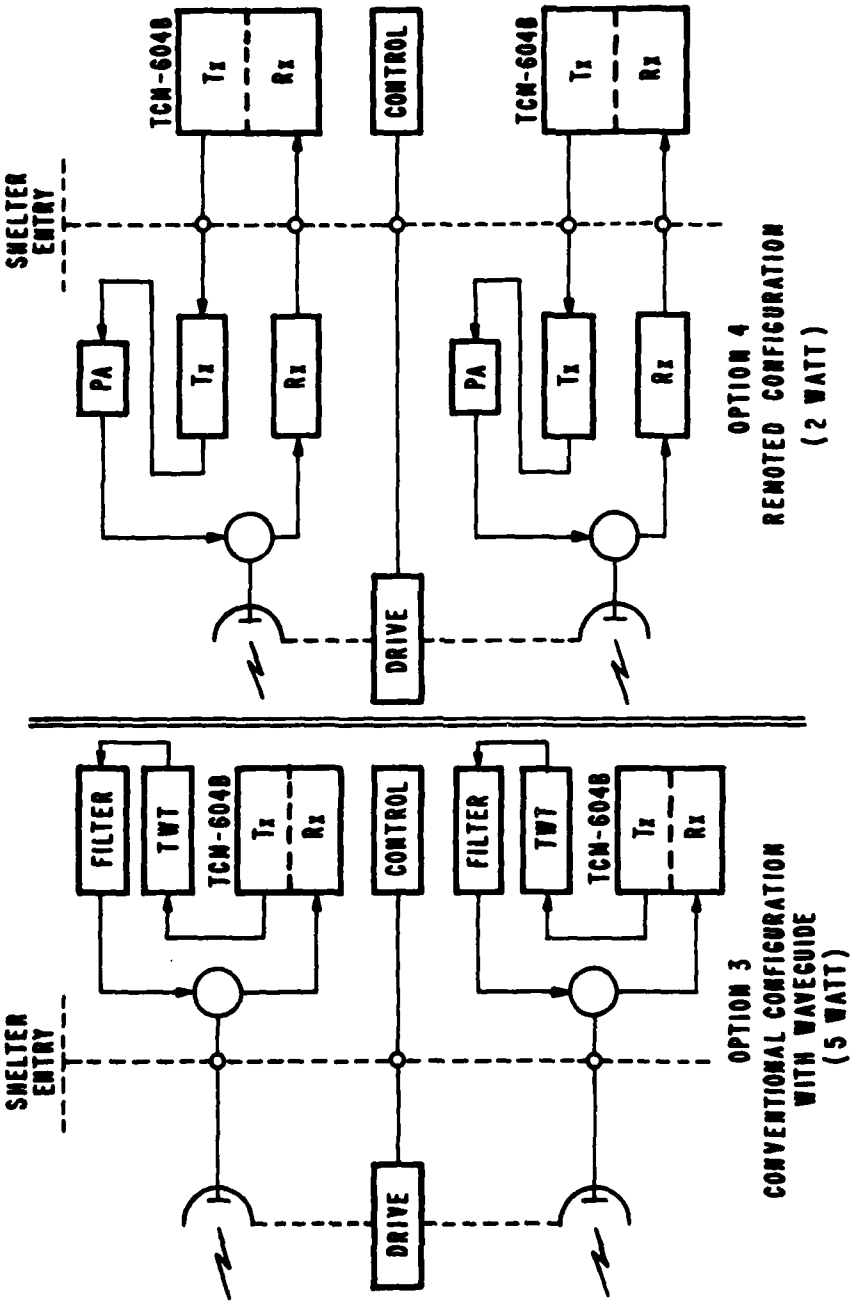

Figure 10. Optional Radio Configurations 3 & 4

tions are provided by half of an AN/FCC-97 eight-port time-division multiplexer.

The FCC-97 equipment serves to multiplex and demultiplex up to eight full duplex, asynchronous T1 lines. The multiplexed T1 lines are entered into the radio transmitter at baseband. Similarly, the baseband signal from the radio receiver is demultiplexed into eight T1 lines.

The FCC-97, as normally used in fixed plant installations, has a redundant configuration with automatic protection switching. This configuration is not used in the Type I Reconstitution Package, where major equipments are available as spares, rather than automatically redundant. (The protection switch has been removed from the FCC-97 and the individual multiplexers are connected separately. Also, the DC power supply has been replaced with an AC supply. In this document, all references to AN/FCC-97, FCC-97, T1-4000 or time-division multiplexer apply to the same nonredundant version of the multiplexer.) Therefore, the Type I Reconstitution Package contains three eight-line TDM multiplexers, one for each possible direction of transmission (for a three-way repeater). Except when the Type I Reconstitution Package is deployed to restore a three-way branching repeater, an unused multiplexer may be utilized as a manually selected spare.

The FCC-97 TDM unit is supplied with a T1 test-word generator/error detector. The transmit (XMT) side of this unit generates a pseudo-random bipolar T1 format word pattern. The receive (RCV) side accepts a pseudo-random bipolar stream, checks every bit for its validity, and gives an indication of error, discontinuity in the signal, overflow or high error rate. The XMT and RCV sections are designed to operate independent of each other.

Removeable front panel covers have been added to the standard FCC-97. The covers are intended for use during transit and must be removed during operation to allow circulation of air. They are fastened with straps; sponge rubber spacers are affixed to the inside of each cover to act as card retainers.

1.2.1.1.3 PCM Multiplexer. The first-level PCM multiplexer equipment is included as part of a TSEC/CY-104A, together with the cryptographic and necessary interface equipment. This equipment is used to convert 24 VF circuits into PCM signals, which are then multiplexed together to provide a composite, 1.544 Mb/s digroup (T1) signal for encryption and application to the second-level multiplexer. Five of the individual VF channel modules can be replaced with data modules that will accept asynchronous binary data

signals at 0 to 20 kb/s (without strobe) or 50 kb/s (with strobe), or data channel units that will accept 32, 48. 56, or 64 kb/s synchronous inputs. No direct entry data cards are supplied with the equipment shelter. They are special-purpose hardware and should be acquired only as detailed reconstitution plans dictate.

The TSEC/CY-104A PCM first-level digital multiplexer can interface up to 24 full-duplex telephone voice circuits with a data line operating at 1.544 Mb/s, having bipolar pulses (T1 format). Each circuit is multiplexed and demultiplexed onto and from the T1 line by a single plug-in circuit card. The CY-104A can accommodate up to five full-duplex digital data circuits by replacing voice channel cards with data channel cards (channels 8 through 12). The TSEC/CY-104A multichannel ciphony system consists of three major subassemblies:

Wideband PCM Trunk Carrier	TSEC/HY-12A
Full-duplex Key Generator	TSEC/KG-34A
Signal Interface & Control	TSEC/HN-74

The HY-12A, which is the military designation for a VICOM D2 channel unit, multiplexes/demultiplexes the 24 channels. The KG-34A serves to encrypt/decrypt the T1 data stream. The HN-74 interfaces the HY-12A with the KG-34A and the KG-34A with the T1 data line.

The HY-12A has been modified to include sponge rubber card retainers on the inside of the removeable covers. These retainers are intended to support the plug in units during transit and to reduce strain on the PC card connectors. The HY-12A is designed for operation with the front cover in place.

A transportable, containerized version of the CY-104A has been developed to provide VF access to the DCS for tactical forces. The transportable CY-104A will be positioned within the site equipment building and interconnected with the tactical user by a special tactical interface panel, mounted in the outside wall of the equipment building. Although not considered a reconsitution asset, the transportable CY-104A is needed when the reconstitution packages are utilized, to provide VF access to the DCS at mountaintop sites (See Section 2.3). The transportable CY-104A can also be used to augment the 96 channel capacity of a reconstitution terminal configuration (Paragraph 1.2.1.1(3)).

1.2.1.1.4 Patch & Test Facility. The patch & test facility is rack-mounted at a central location within the equipment shelter. It

contains all patching facilities and test equipment required for short term system reconfiguration and operational maintenance, consisting of the following major items:

(a) Baseband Patch Panel

(b) T1 Patch Panel

(c) VF Patch Panel

(d) Entry Panels

(e) Test Equipment

1.2.1.1.4(a) Baseband Patch Panel. The baseband patch panel provides jack access to the full-duplex baseband interface between the microwave radio sets and the T1-4000 TDM multiplexers. The jacksets provide line, equipment, and equipment monitor presentations. Baseband circuits are not normalled-thru the patch panel. Interconnections are made by U-links or patch cords. Baseband U-links and patch cords are color-coded PURPLE.

The baseband patch panel also includes jack presentations of the baseband monitor signals from associated radio transmitters and receivers, such as:

OFF AIR MON - XMTR A

OFF AIR MON - XMTR B

AUX OUT - RCVR A

AUX OUT - RCVR B

70 MHz IF - RCVR A

70 MHz IF - RCVR B

Trunk Line 1

Trunk Line 2

The two trunk-line jacks, situated at the baseband patch panel, also appear at like-marked BNC connectors on a small panel mounted above the VF patch panel, adjacent to the oscilloscope. These cables provide easy access for the test oscilloscope to the various signals that appear on the baseband and T1 patch panels.

1.2.1.1.4(b) T1 Patch Panel. The T1 patch panel provides jack access to the full-duplex T1 interfaces of the T1-4000 TDM multiplexers. Each jackset provides line, equipment, and equipment monitor presentations. T1 circuits are not normalled-thru the patch panel. Interconnections are made by U-links or patch cords. T1 U-links and patch cords are color-coded BLUE.

The T1 patch panel also includes jack presentations for the full-duplex T1 interfaces of the four first-level PCM multiplexers. This feature permits the use of any of the PCM multiplexers with any T1 line of any of the three TDM multiplexers.

1.2.1.1.4(c) VF Patch Panel. The VF patch panel provides jack access to the full-duplex voice-frequency circuits of each of the four PCM multiplexer equipments. Each jackset provides equipment, line, equipment monitor, and line monitor presentations for each side of each VF circuit. The VF patch panel also includes jack presentations for the interfaces between all elements of the orderwire and service channel circuits and for any local telephone circuits that are implemented for maintenance, tower erection, antenna alignment, or communication with adjacent buildings.

> Note: The orderwire keyset circuit is normalled-thru J5 "SPARE" on the VF patch panel and appears on J5 "SPARE" adjacent to channel 54, at the VF entry panel.

VF patch cords are color-coded GRAY.

1.2.1.1.4(d) Entry Panels. Access to baseband, T1, and VF circuits is provided at the equipment shelter wall, on either side of the shelter door.

VF circuits are normalled-thru the VF patch panel to two VF entry panels. Channels 1 - 48 are accessible at the VF entry panel to the left of the shelter entrance and channels 49 - 96 are accessible at the VF entry panel to the right (viewed from outside the shelter). All VF circuits are lightning protected. Lightning arrestors are accessible on the side walls of the entry panel boxes. The arrestors are marked individually, for the corresponding VF channels.

The baseband and T1 entry panel is located immediately below the left VF entry panel. One duplex baseband circuit and eight duplex T1 circuits appear at the baseband and T1 entry panel "external" jacks.

1.2.1.1.4(e) Test Equipment. The patch & test facility includes a minimum complement of rack-mounted test equipment to facilitate operational maintenance. The following are included:

Oscilloscope - AN/USM-452(V)1
Tektronix Model 465M

Test Set - Hewlett Packard 3550B

Volt-Ohm-Milliammeter - ME-418/PSM-37

Power Meter - Narda Model 8401
w/Model 8420 Detector Mount

Frequency Counter - Hewlett Packard HP 5340A

Ancillary Items-

TDM Multiplexer
Extender Board (VICOM 4015-01)
Fuse & Lamp Kit (P/N 15180-010)
Patch Cords (9) (310-310)

PCM Multiplexer
Common Equipment Extender ON014930
(VICOM 3100-01)
Span Terminating Shelf Extender Card ON014932
(VICOM 3020-01)
TSEC/KG-34 Element Extender ON056293-1
TSEC/KG-34 Element Extractor ON056450
TSEC/KG-34 Cable Extender ON057352

Coaxial RF Attenuators
2 @ 6 dB (TCM-AT6)
2 @ 10 dB (TCM-AT10)
2 @ 20 dB (TCM-AT20)
2 @ 30 dB (TCM-AT30)

NOTE: The HP 3550B Test Set operates on two sets of four batteries; one set for the generator and one set for the meter. In both cases, the batteries are nickel-cadmium, rated at 6 volts, 0.225 ampere-hours each. The generator batteries are Hewlett Packard part number HP 1420-0015 (Gould #6V0/225B), while the batteries for the meter are Hewlett Packard part number HP 1420-0243 (Gould #402037-5). The difference between the two battery types is primarily physical size.

Because all equipment contained in the equipment shelter, except the TerraCom TCM-604B radios, is common to DEB fixed plant equipment, test equipment for basic alignment and maintenance is assumed to be included in the standard complement distributed to DEB mobile maintenance teams. In addition to the test equipment contained in the shelter, the following is needed for alignment and maintenance of the TCM-604B radios:

Spectrum Analyzer - Hewlett Packard HP 141T
with
IF Section - HP 8552A
RF Section - HP 8555B

Test Oscillator - Hewlett Packard HP 654

Digital Volt-Ohm Meter - Fluke Model 8300A

AC Voltmeter - Hewlett Packard HP 400EL

These standard items were not included in the reconstitution packages, but are considered essential for maintaining radio operational readiness. Functional equivalents are acceptable.

1.2.1.1.5 Supervisory Subsystem. The supervisory subsystem includes all equipment and provisions to meet system requirements for orderwire and fault alarm. The supervisory subsystem equipment configuration for a simple repeater, as presently wired in the shelter, is shown in Figure 11. When the Type I and Type I A Contingency Packages are configured as a three-way repeater, the third (Type I A) radio is connected as indicated by the dotted lines in Figure 11. Detailed wiring connections are shown in the Logic Wiring Diagram Supervisory Patch Panel Subsystem (A1-13815D) in the shelter library.

The supervisory subsystem includes the following equipment (not all of which is depicted in Figure 11):

Coupling Transformers	PulseCom 1691-8G
Line Amplifiers	PulseCom 1661-4
Attenuator Pads	PulseCom 1663-2
Conference Bridges	PulseCom 1662-1
Mounting Shelves	PulseCom 10304-1
Low Pass Filters	Karkar 1492
High Pass Filters	Karkar 1493
Orderwire Intercommunication Termination Unit	TA-918(1)/FSC

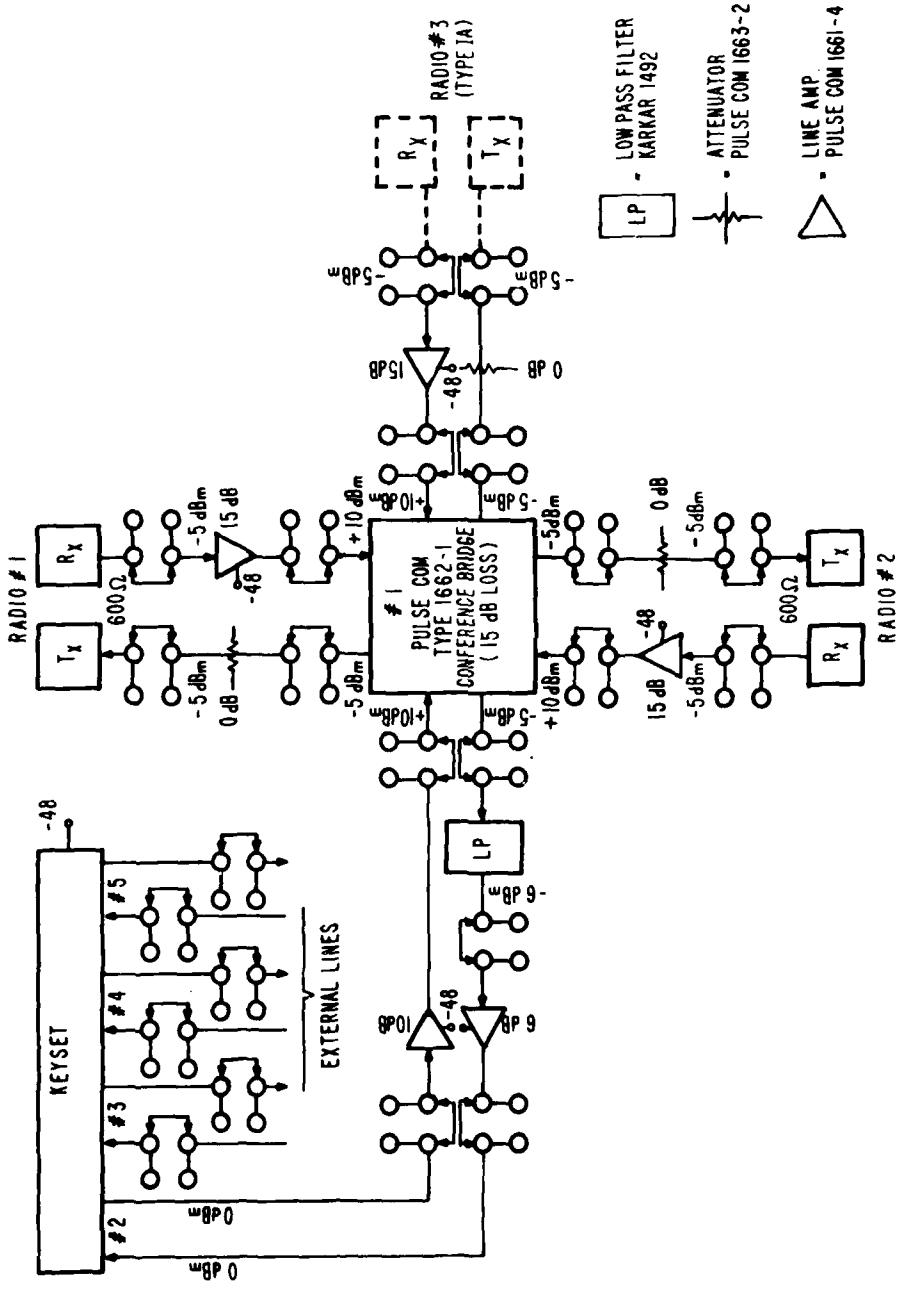

Figure 11. Supervisory Subsystem Equipment Configuration

Express-Link-Local Orderwire Unit	TA-925/FSC
Power Supply	Lambda LCS-C-48

(a) Orderwire. The orderwire configuration is entirely compatible with that of the DEB Stage I network. Suitable options have been selected with the TCM-604B microwave radio set to assure RF compatibility. Additional compatibility at the VF interfaces has been provided, for the sake of commonality, using equipment common to DEB Stage I orderwire configurations.

(b) Fault Alarms. DEB Stage I is provided with a Fault Alarm System (FAS) for monitoring and remote control of equipment at unattended sites. The equipment for the FAS is interconnected on a party-line basis, by means of a duplex telemetry circuit, using one of the supervisory channels.

The Type I Reconstitution Package provides a repeater connection for the FAS network of DEB Stage I, but will not interface with the DEB network for remote fault alarm reporting and remote control. Instead, the shelter is equipped with its own Alarm Status Unit (ASU), to alert personnel at the reconstituted site to an equipment malfunction. A remote alarm (bell) is mounted on the fan housing outside the shelter to alert personnel to an alarm condition when the shelter is unoccupied.

The ASU is rack mounted between the baseband and T1 patch panels. Interface connections are made at a terminal strip panel mounted immediately below the ASU.

1.2.1.2 Mast/Antenna Subsystem (MAS) OE-308/U. Antenna Group OE-308/U is the Mast/Antenna Subsystem portion of the Type I reconstitution package. The MAS is a lightweight, self-contained, transportable, microwave antenna system that operates in the 7.75 to 8.4 GHz frequency band. It is designed to be erected by six men at a prepared site in less than six hours. The OE-308/U consists of:

AS-3396/U	antenna assembly,
AB-1277/U	tower support group,
ON-212/U	interconnecting group,
MK-1986/U	tool kit, and
MT-6096/U	shipping and storage container.

Figure 12 is a drawing of the MAS.

The antenna assembly consists of two six-foot diameter, solid surface parabolic reflectors with radomes, antenna mounting platform, obstruction lights, feedhorns, waveguide, and power/control cable. The antennas are mounted back-to-back on an antenna platform (torgue frame assembly). They can be positioned, electrically, in both azimuth and elevation, from an antenna control panel, which is rack mounted within the equipment shelter.

The tower support group includes a launcher assembly, work platforms, mast sections, griphoists, and erection and operational guys. All equipment necessary for erection, assembly and operation of the MAS is supplied. The mast is capable of being erected to incremental heights that are multiples of two mast sections, from a minimum height of 32 feet to a maximum of 100 feet.

The interconnecting group consists of all interconnecting cables, an upper junction box, and control panel.

Provisions are made for mounting the TerraCom radio remote kits on the antenna platform (Figure 13) and for securing the remoting cables to the mast (in lieu of waveguide), if this option is selected (See Paragraph 1.2.1.1.1(j), options 2 and 4.). A messenger cable is included to provide physical support for the waveguide (or remoting cables) between the mast and the equipment shelter.

Power consumption of the MAS (including A/C warning lights) is approximately 116 watts.

1.2.1.3 Prime Power Generator. The PU-405 A/M generator set is a portable, multipurpose, 15 kilowatt (60 Hertz), self-contained power plant, consisting of a water-cooled diesel engine driving a 15 kilowatt alternator (a.c. generator). The complete unit is enclosed in a weather-resistant sheet metal housing and mounted on a 2-1/2 ton modified M2001A1 trailer chassis. The unit also contains, within the housing, a fuel system, electric starting system, engine speed regulation system, generator voltage regulation system, battery charging system, winterization equipment, and an instrument control panel to provide complete control of the generator set.

Two generators are provided with each Type I Reconstitution Package. They are interconnected through a synchronizer (switch box assembly), mounted on the fender of one generator. The synchronizer facilitates parallel operation of the generators, eliminating the need to shut down power for refueling or maintainence. (The off-

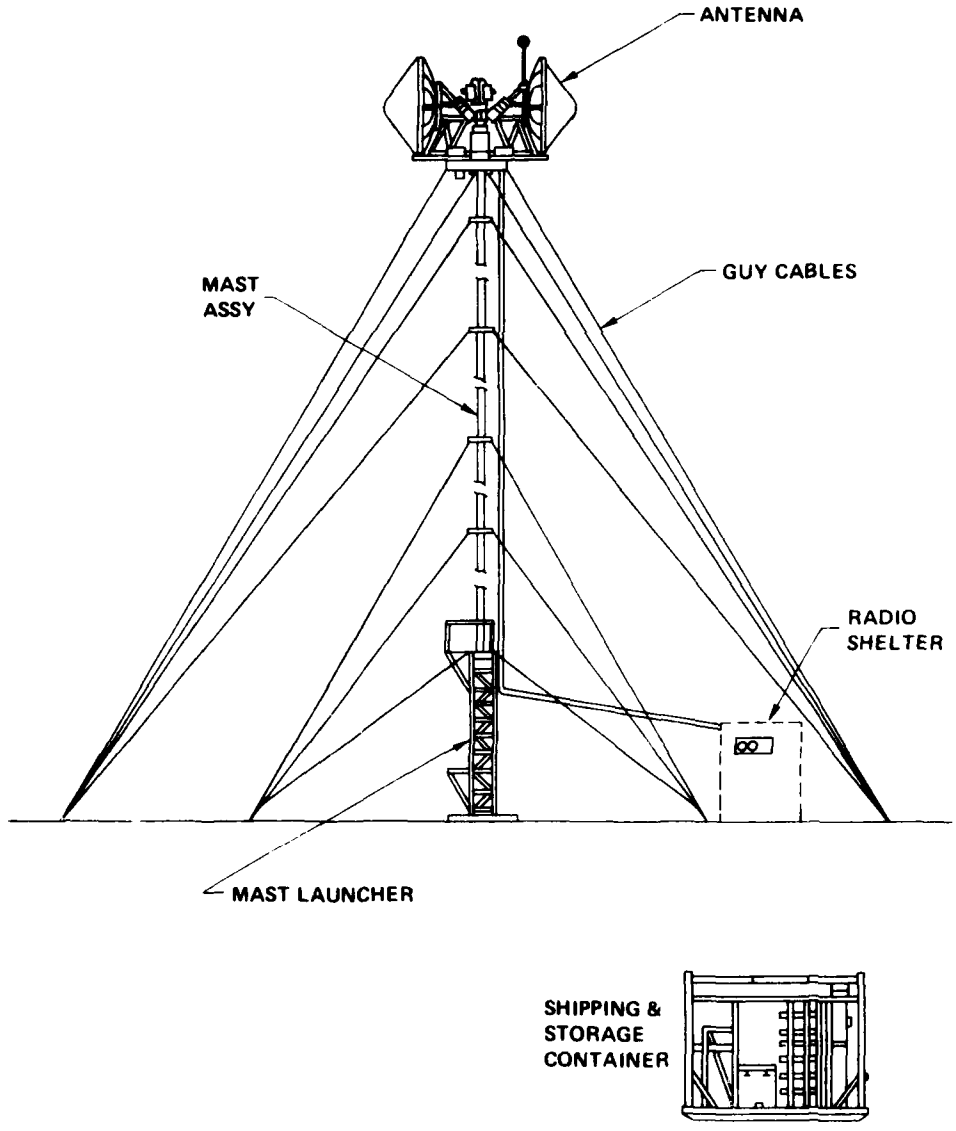

Figure 12. OE-308/U Mast Antenna Subsystem

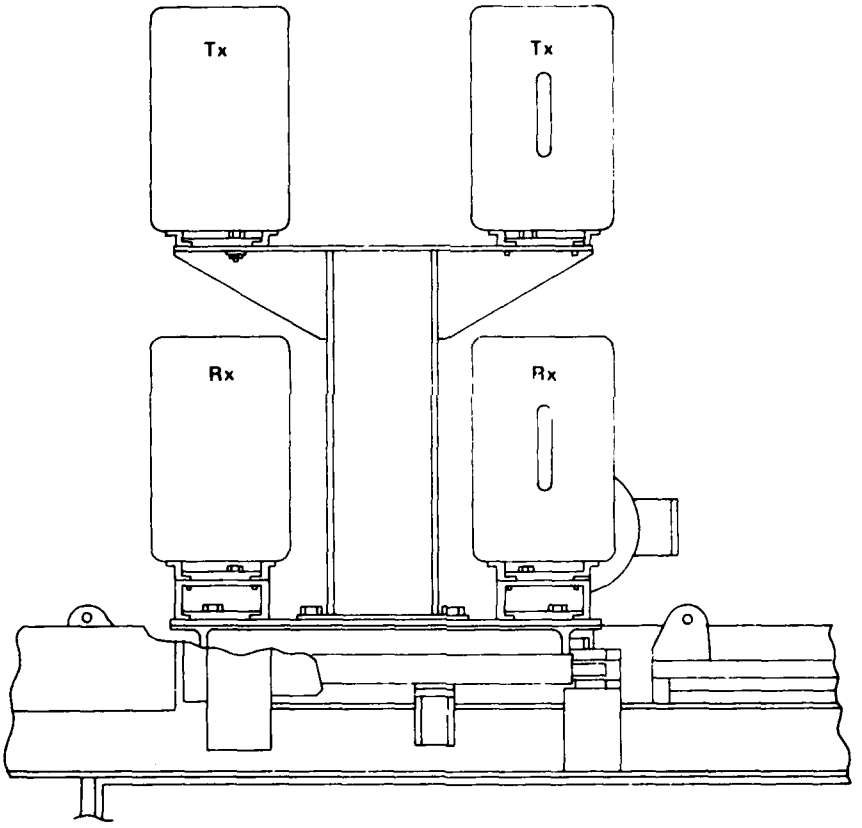

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Figure 13. TerraCom Radio Remote Kit Mounting

line generator can be powered up to take the load when the on-line generator is shut down.) Also, continuous parallel operation increases total primary power capacity to 30 kilowatts (60 hertz).

The generators are sized to provide a capability to restore fixed plant power. A strap option, to convert generator output from 120/208 to 220/380 VAC, is provided. If a generator is operated at 50 hertz, its output power is derated to 12.5 kilowatts. Under full load, a generator will consume about 1.5 gallons of diesel fuel per hour.

A pair of generators comes equipped with the following;

Power Cables - Two power cables are provided to interconnect the generators and the switch box assembly. Connections at the generators are made with pig-tail leads and connection to the switch box assembly is made by plug-in connector.

Paralleling Cables - Two cables are provided to connect the generator synchronizer controls with the switch box assembly.

Load Power Cables - Also included is a 15 foot power cable to connect the switch box assembly to the load. Connections at the switch box assembly are made with pigtails at TB1 and, at the load, with a standard power connector that will mate with the shelter. A 100 foot extension cable is provided to allow flexibility in positioning the generators. (An additional 100 foot extension is included with the shelter.)

Cable Reels - Two reels are provided for storage of the cables. The cable reels are mounted, one on each generator fender, by means of a hold-down T-bar.

Personnel operating the PU-405 A/M generators must be properly qualified. It is recommended that training be conducted with the Type I generators.

1.2.2 Type I A Reconstitution Package (AN/GSC-47)

The Type I A Reconstitution Package consists of two TerraCom TCM-604B microwave radios, two transportable T1-4000 multiplexers, two antenna assemblies, an orderwire telephone, and two generator sets. Figure 14 is a block diagram of a Type I A Reconstitution Package, configured as a simple baseband repeater. As an option,

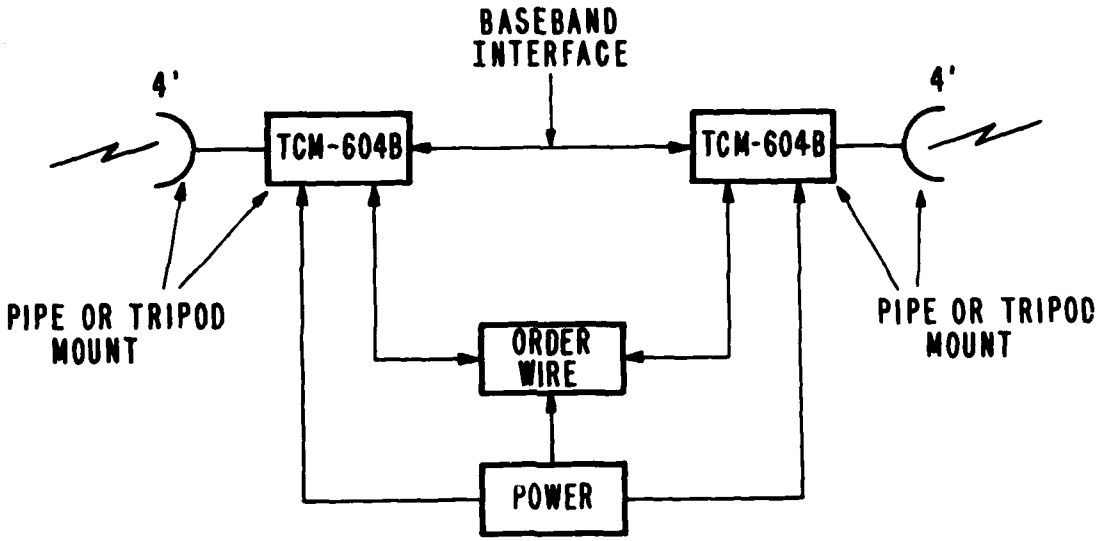

Figure 14. Type I A Reconstitution Package (Baseband Repeater)

the Type I A system can also be interconnected with two transportable T1-4000 multiplexers, as shown in Figure 15.

The Type I A Reconstitution Package provides the following major functions:

the ability to function as a full-duplex microwave radio repeater, and

the ability to function as a through repeater for DEB Stage I orderwire and fault alarm circuits while, at the same time, providing access to the orderwire circuit.

Each component of the Type I A system is man-transportable to facilitate rapid reconstitution of DEB I mountaintop sites (Mt. Cimone, Paganella, Cima Gallina and Zugspitze), where access is limited to either chair lift or cable car. Each of the aforementioned sites is a simple repeater. The Type I A system can be connected to provide regeneration of the digital signal, utilizing the transportable second level multiplexers, weather permitting (See Paragragh 1.2.2.2.), or as a baseband repeater, without multiplexers. Field tests have shown that the latter equipment arrangement does not cause appreciable system performance degradation.

Four-foot antennas have been provided for ease in carrying. To overcome the loss in gain resulting from the use of four-foot antennas (the smallest DEB antenna is six feet) and to assure adequate fade margins on long links, two-watt solid state power amplifiers have been included with the Type I A Reconstitution Package microwave radios.

Restoration of a three-way repeater is accomplished by combining the Type I Contingency Package with one half of the Type I A system and interfacing the two systems at the equipment shelter baseband entry panel. (See Section 2.1.3.)

The Type I A Reconstitution Package can also provide a tactical interface to the DCS at DEB mountaintop sites, by utilizing one transportable T1-4000 (1/2 FCC-97), one radio, and one antenna assembly. The radio is connected through the site tactical interface panel baseband connection to the transportable T1-4000 (positioned inside the site building) and a link is established with a Type I Reconstitution Package prepositioned in an adjacent valley. (See Section 2.3.)

1.2.2.1 Microwave Radio. The radio component of the Type I A Reconstitution Package was selected from the TerraCom TCM-600 series

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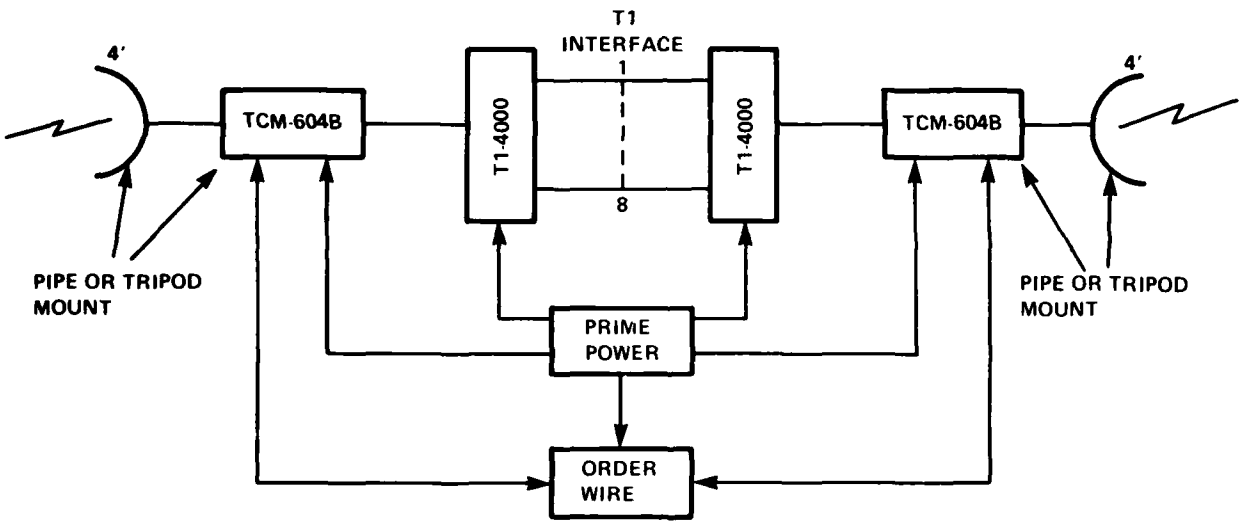


Figure 15. Type I A Reconstitution Package (Regenerative Repeater)

of microwave equipment and is essentially the same radio used in the Type I system. Packaging of the transmitter and receiver is the same. Minor differences include cooling for the transmitter and the method of mounting. The Type I A radio transmitter does not require a cooling fan. Mounting shelves (or L-brackets) are provided at the rear of the antenna for the Type I A radio transmitter and receiver.

1.2.2.1.1 Transmitter. The transmitter is continuously tunable over the 7.7 to 8.4 GHz frequency band, at an RF output of 0.5 watt. Each transmitter is equipped with the following functional modules:

Power Supply Unit

Control/Monitor Unit

Baseband/Audio Unit

AFC Unit

Synthesizer Unit

RF Head

1.2.2.1.2 Solid State Amplifier. The TerraCom TCM-SSPH solid state amplifier provides a nominal two watt output across the band 7.7 to 8.4 GHz, when driven by the output of the transmitter RF Head (6 dB gain). The amplifier, together with its power supply, is mounted in a remote kit cover and is interchangeable with the solid state amplifier in the Type I shelter. A special bracket adapts the amplifier for mounting on top of the transmitter.

1.2.2.1.3 Receiver. The receiver is continuously tunable over the 7.7 to 8.4 GHz frequency band. Each receiver is equipped with the following functional modules:

Power Supply Unit

Control/Monitor Unit

Baseband/Audio Unit

AFC Unit

IF/Demodulator Unit

RF Head

1.2.2.2 Transportable Second Level Multiplexer. A containerized version of the T1-4000 second level multiplexer is provided and can be used for signal regeneration and for those cases where access is required at the digroup level (such as for tactical interface at less accessible simple repeater sites).

The transportable second level multiplexer is a modified AN/FCC-97. The standard AN/FCC-97 is a militarized version of the commercial T1-4000. The major difference is that the FCC-97 is a redundant multiplexer with automatic switching capability. The FCC-97 also operates from a 48 Volt DC power source. The transportable multiplexer supplied with the Type I A is nonredundant (minus the automatic switch) and has been provided with an AC power supply.

Although it is mounted in a weather-tight container, the transportable FCC-97 may not function properly if exposed to very low temperatures. Operational temperature range for the AN/FCC-97 is listed in the DEB Digital Systems Operations Manual (DSOM) as +30 to +120 degrees Farenheit (-1 to +49 degrees Celsius).

1.2.2.3 Antenna Assembly. Each antenna assembly includes the following subcomponents:

Antenna (four-foot diameter)

Radome

L-Bracket

L-Bracket Adapter

Pan/Tilt Head

Tripod

Pipemount

The antenna may be mounted by means of the L-bracket, L-bracket adapter and pan/tilt head to a heavy duty tripod or, if appropriate provisions have been made at the site, it can be clamped with a pipemount to a 4.5 inch (outer diameter) vertical pipe. Because of strong winds encountered at the high altitude sites, the latter method of mounting is preferable. If a tripod is used, the reconstitution team must devise a method of anchoring the legs. One method commonly employed is to seat the tripod legs in containers, such as wooden boxes, and then fill the containers with rocks. Guying the tripod can be considered as an alternative.

1.2.2.4 Orderwire Telephone. Two types of orderwire telephone keysets were produced for the Type I A system: a prototype keyset, designed and constructed by The MITRE Corporation, and an operational keyset, manufactured by Raven Electronics Corporation. The former unit is not supportable in the military inventory and was produced for interim use until the Raven unit was made available. The MITRE keyset can serve as an emergency backup to the Raven keyset. Both units have been delivered to the responsible agencies and will operate equally well with the TerraCom Radios.

The MITRE orderwire telephone, excluding cables, is packaged in a weather-tight transit case. It includes the following:

handset or headset operation

dual tone signaling (touch tone compatible)

two digit sequential address recognition

local audible alarm and light

remote audible alarm

conference bridge interface with the TerraCom radios

All connectors include captive covers with environmental seals. The headset, handset, and remote alarm are removable.

The telephone will respond to any one of 100 two-digit addresses (144 if the * and # symbols are used). The digits can be selected by setting internal switches. On recognition of the correct address, the light (LED) and audible alarms are pulsed until the call is answered. Going "off hook" silences the alarms and turns the LED on steady. After a short delay, the audible alarms can be turned on by receiving the address again, even if the "off hook" condition still exists. The "hook" switch is a lever that must be manually operated. The audible alarm can be disabled for covert operation. The remote alarm can operate up to 10,000 feet from the telephone.

1.2.2.5 Generator Sets. Each generator set is a portable unit consisting of a Military Standard 1-1/2 horsepower gasoline engine, model 1A08-3, directly coupled to a Model MEP-014A generator (0.5 kilowatt, 120 or 240 volt, 60 hertz, a.c., single phase), and the necessary components and accessories required for a self-contained generating unit. The unit is cushioned with rubber mounts and is mounted in a tubular aluminum frame. It will operate at an angle of

15 degrees (maximum) in any plane from horizontal. The generator is radio suppressed. Total weight is 78 pounds.

The average fuel consumption of the generator is half a gallon per hour for full load, continuous operation. The generator fuel tank capacity is one gallon, which is roughly equivalent to two hours of operation. A fuel adapter kit is supplied which provides the capability to extend continuous operating time, by utilizing auxiliary fuel containers. The adapter can be used with 5 gallon Jerry cans, or 15, 30, or 55 gallon drums. The auxiliary tank is accessible by means of a selector valve. The generator can be run continuously, while refueling the auxiliary tank, by selecting the standard generator fuel tank momentarily, during refueling.

Although the MEP-014A generator set has a continuous duty classification rating, fuel consumption will create a logistics problem if reconstitution is for an extended period of time. It is therefore important that commercial or site power be restored as rapidly as possible, to provide an alternate means of powering the Type I A Reconstitution Package. For this reason, and also to provide power for tactical interconnect, external access to commercial/site power (120 volt, 50/60 hertz), must be made available at mountaintop sites.

Power consumption of the Type I A Reconstitution Package (excluding the transportable T1-4000) is 350 watts maximum, including the two solid state amplifiers. At an altitude of 10,000 feet, the MEP-014A output power is derated to 335 watts. If the solid state amplifiers are used (40 watts each), one generator is insufficient to power the Type I A system. This situation is remedied by utilizing two generators and splitting the load so that each radio is on a separate generator.

2.0 DEPLOYMENT CONFIGURATIONS

Reconstitution deployment configuration information for each DEB Stage I site is presented in this section, grouped first by the type of reconstitution package needed (I or I A), then by site configuration (terminal, repeater, or branching repeater) and, finally, by individual site.

2.1 Type I Reconstitution Package (AN/GSC-48) Configurations

The Type I Reconstitution Package will be used to restore Vaihingen, Aviano, Vicenza, Coltano, Hohenstadt, Ceggia, Mt. Serra, Mt. Corna, and Mt. Venda. It may also be employed, together with the Type I A Reconstitution Package, to establish "down-the-hill" links for tactical interface at the less accessible sites (Section 2.3.1).

At terminal and terminal/repeater sites, full restoration of DEB equipment would require PCM first level multiplexer assets exceeding the capacity of a single Type I Reconstitution Package. At sites where more than four first level multiplexers are required, a priority system will be needed to ascertain proper allocation of digroups. For this reason, and since priorities may change, T1 patch connections listed in the following paragraphs are intended to serve as examples only; they are subject to revision, as may be deemed necessary, on a case by case basis.

Alternatively, consideration may be given to utilizing transportable CY-104As to augment Type I reconstitution package first level multiplexers, thereby increasing circuit capacity. Provisions are made for T1 patch and external appearances at the T1 and baseband entry panel, simplifying those T1 interconnections. However, utilization of transportable CY-104As will require that the reconstitution team plan for the necessary primary power connections for the equipment. The PU-405 generator has adequate reserve to power an additional four CY-104As (260 watts each), but no provisions are made for cabling or interconnection. Consideration must also be given to providing shelter for the transportable CY-104As.

If the site tower, antennas and transmission lines are intact, RF connection with the equipment shelter can be accomplished by either

(1) retracting the existing waveguide from the site building and joining it to an appropriate length of rectangular guide, connected to the shelter, or

(2) cutting the existing waveguide at a convenient place near the base of the tower and installing a new waveguide connector (Andrew type 171AC), to accommodate shelter/tower interconnection.

Because (1) avoids the obvious problems involved with installation of a new connector, including possible high VSWR, due to non-tunability of the connector, this solution is most desirable. Retraction of the waveguide to provide access to a rectangular flange will require that the following steps be taken:

(a) Disconnect the flexible waveguide section at the top of the AN/FRC-162 or AN/FRC-165 radio;

(b) Remove all waveguide clamps and supports from the radio to a point at least 25 feet up the tower;

(c) Carefully work the waveguide back out of the building, taking care not to dent or bend the waveguide to a radius of less than 4 feet;

(d) After the waveguide is clear of the building, reattach as many supporting clamps to the tower as possible; and

(e) Install Andrew type 171AC waveguide connecters.

If method (2) is necessary, because of damage to the portion of the waveguide inside the building or for some other reason, two spare waveguide connectors are stored in the shelter.

2.1.1 Terminal Sites

Basic configuration of the Type I Reconstitution Package for restoration of a terminal site is shown in Figure 8 (page 21).

Listed below is the major equipment, common to each DEB I terminal site, required for temporary restoration:

TCM-604B Radio	1 required
AN/FCC-97 TDM 2nd Level MUX	1 required
TSEC/CY-104A PCM 1st Level MUX	4 required

The following are typical equipment shelter patch connections for a terminal:

Baseband -

FROM	CONNECTION	TO
Radio #1		2nd Level MUX #1
XMIT	U-Link	XMIT
RCV	U-Link	RCV

T1 -

FROM	CONNECTION	TO
1st Level MUX #1		2nd Level MUX #1
XMIT	Patch Cord	XMIT #1
RCV	Patch Cord	RCV #1
1st Level MUX #2		2nd Level MUX #1
XMIT	Patch Cord	XMIT #2
RCV	Patch Cord	RCV #2
1st Level MUX #3		2nd Level MUX #1
XMIT	Patch Cord	XMIT #3
RCV	Patch Cord	RCV #3
1st Level MUX #4		2nd Level MUX #1
XMIT	Patch Cord	XMIT #4
RCV	Patch Cord	RCV #4

2.1.1.1 Vaihingen

(a) Site Data. The Vaihingen site plan, building floor plan and existing site equipment interface drawings are shown as Figures 16, 17, and 18, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Under the tower or in the driveway adjacent to it

Radio configuration - Option 3 (5 watts) (Paragraph 1.2.1.1.1(j))

Orderwire address - 31

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS location - Parking lot at the rear of Building 2316, or between Katzenbach Strasse and Building 2301.

Shelter location - Same as MAS location.

Minimum MAS height - 27 meters (89 feet)/15 sections

Maximum guy radius - 26.5 meters (87 feet)

Antenna polarization - Vertical

Antenna azimuth - 115 degrees 10 minutes (True)

Radio configuration - Option 3 or 4 (5 watts) (Paragraph 1.2.1.1.1(j))

Orderwire address - 31

(d) Frequencies. The following are transmitter and receiver frequency settings for Vaihingen:

Transmitter VCO & Bandpass Filter	8379.5 MHz
Synthesizer Thumbwheel Switches	101244
Receiver Preselector Filter	8218.5 MHz
Receiver Local Oscillator	8148.5 MHz

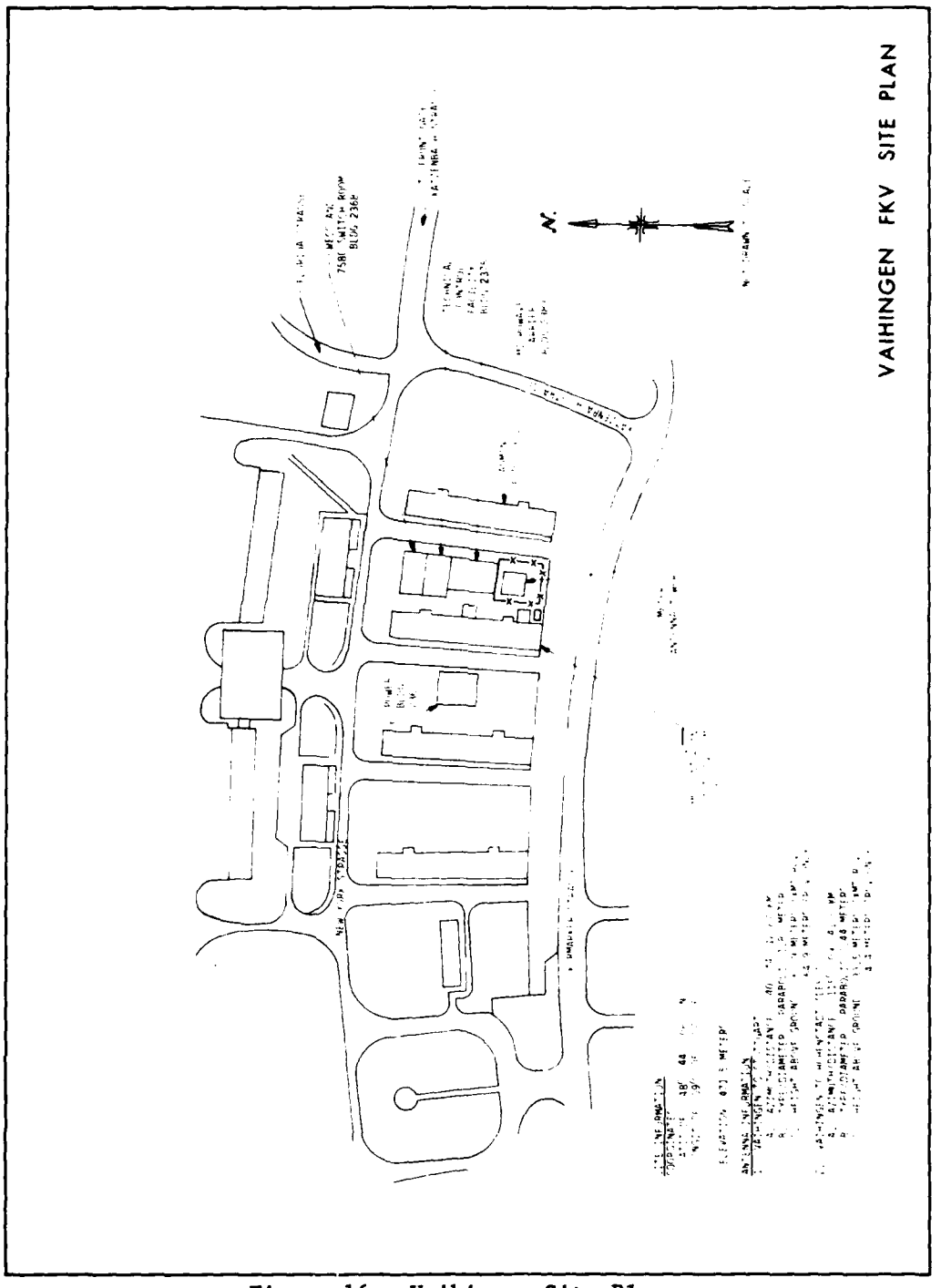
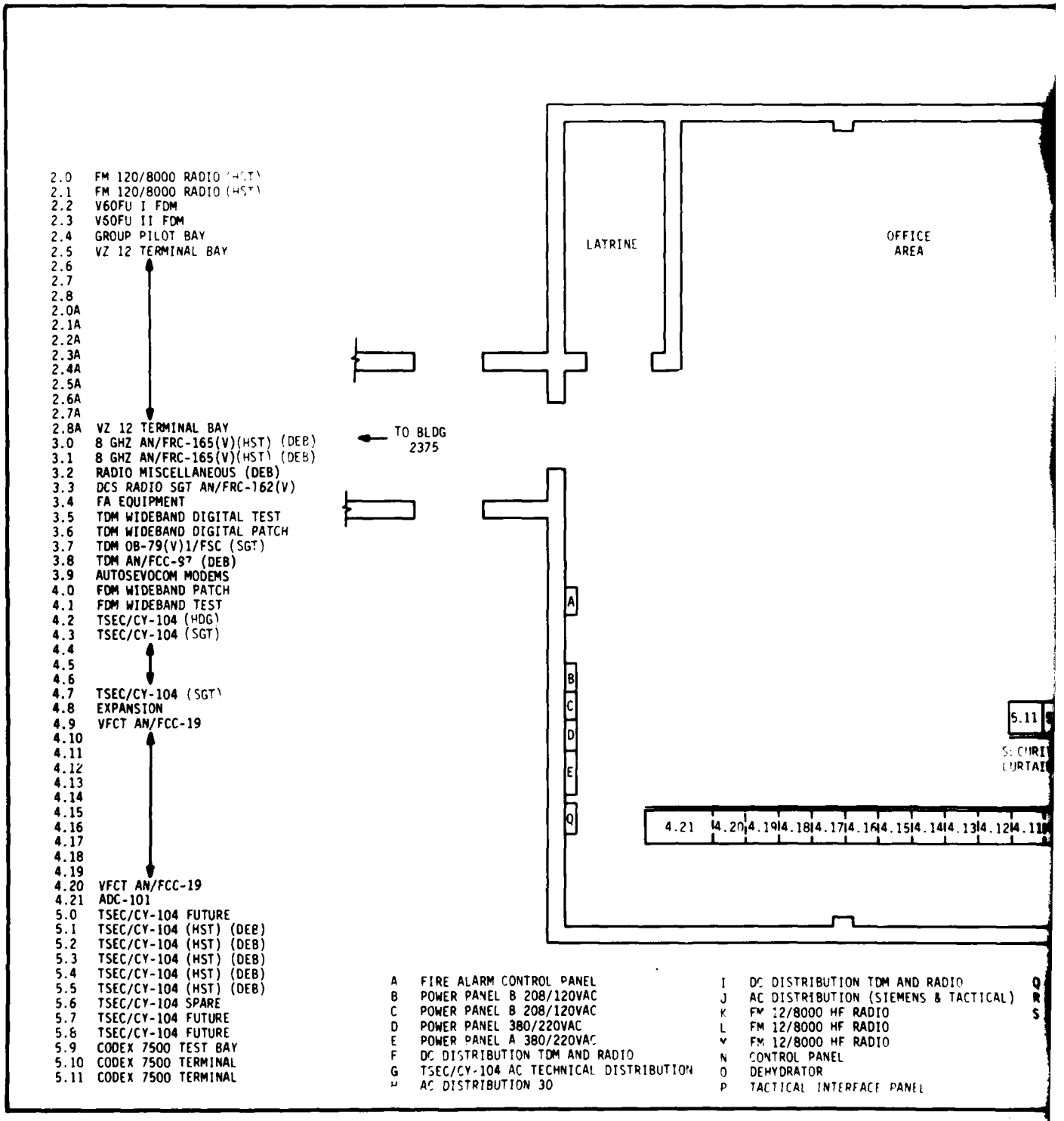
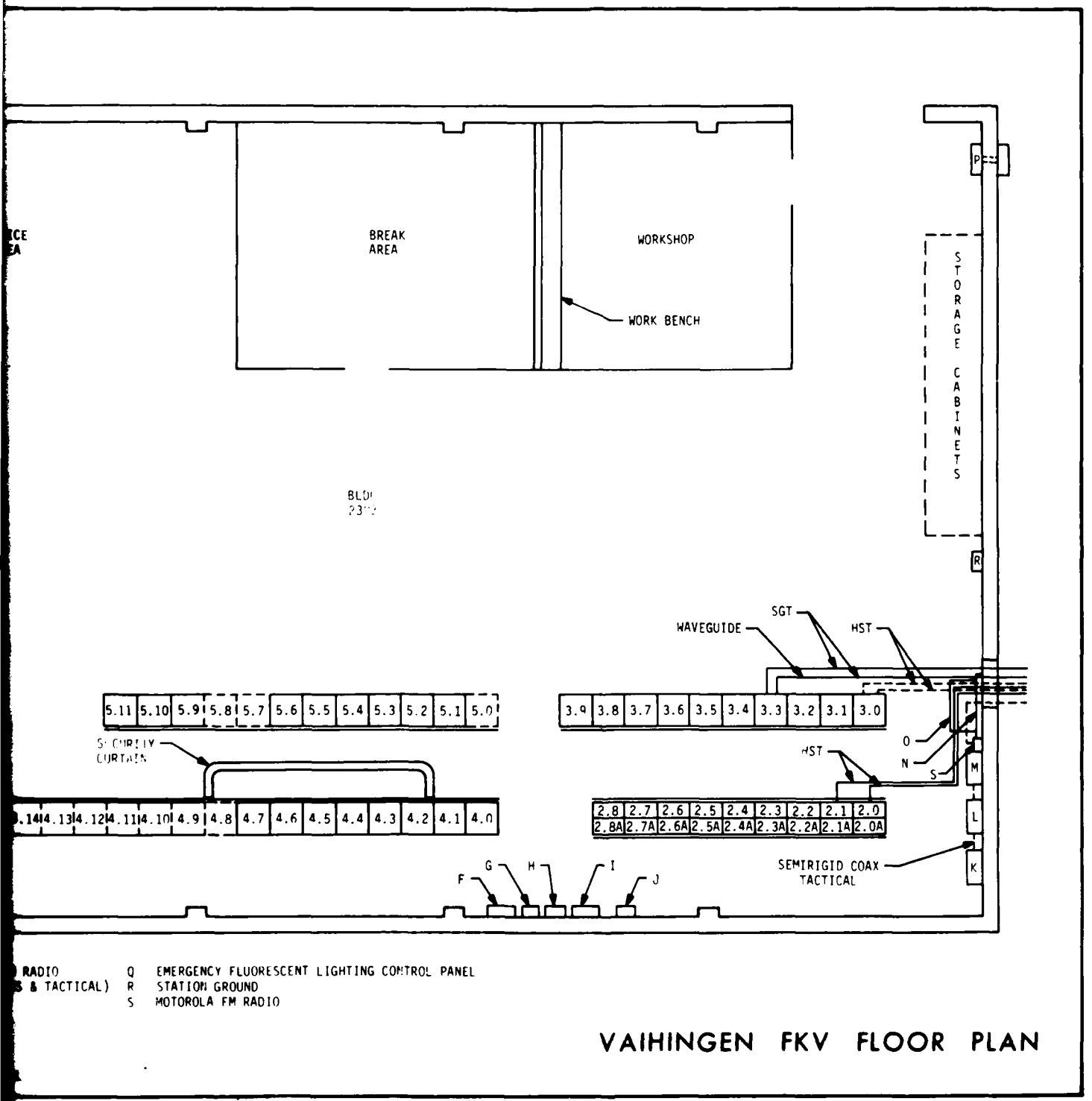


Figure 16. Vaihingen Site Plan





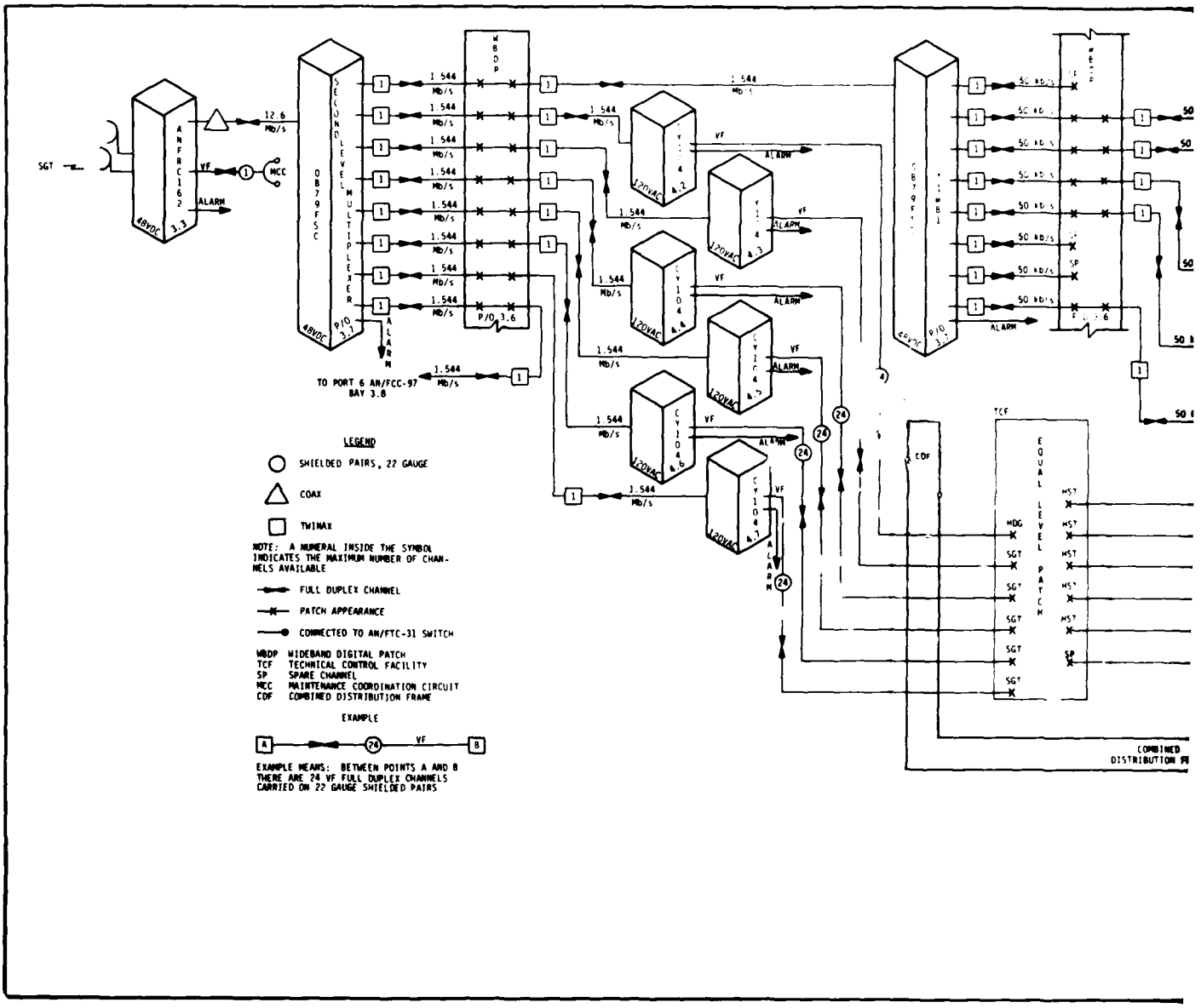
RADIO
& TACTICAL)

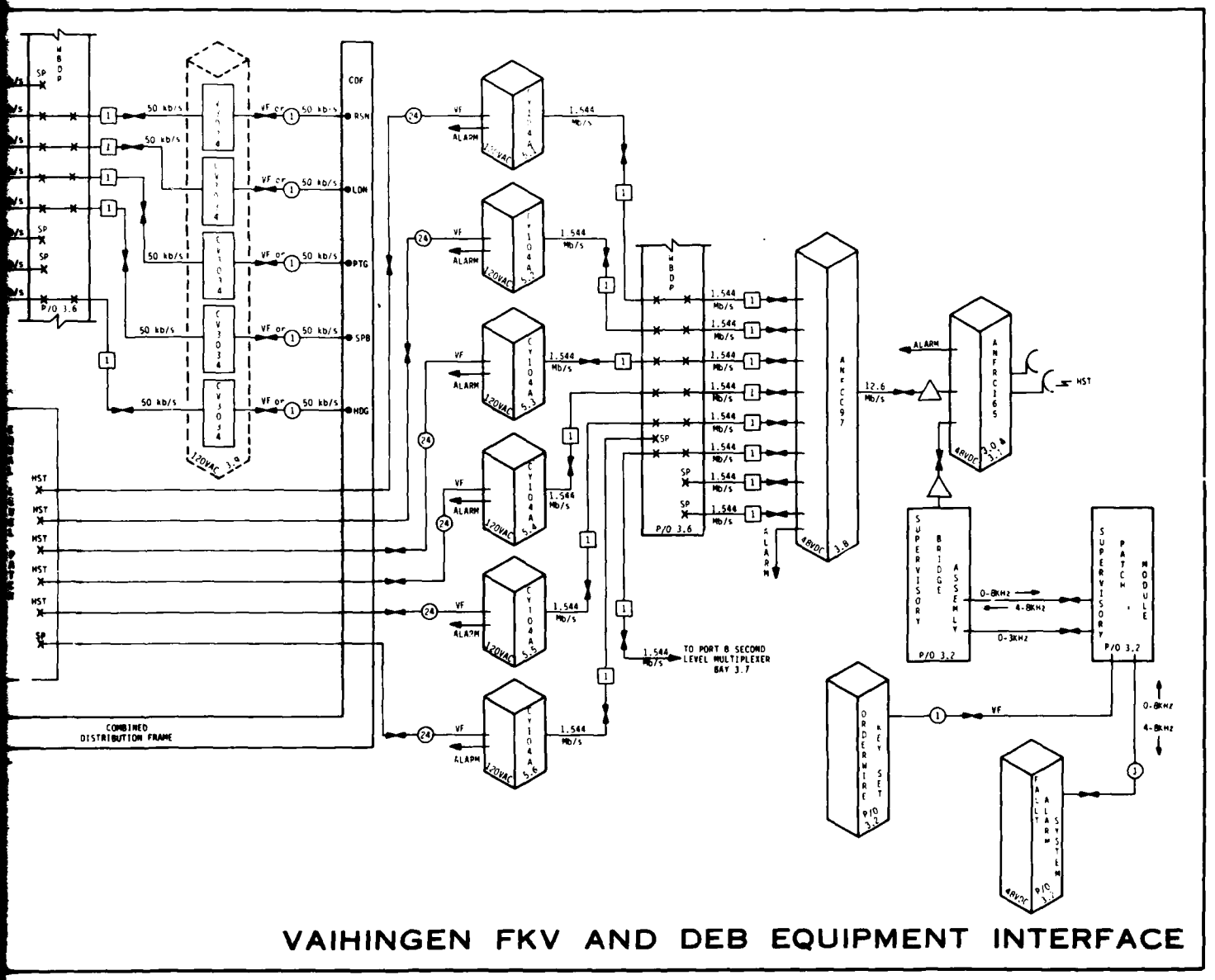
Q EMERGENCY FLUORESCENT LIGHTING CONTROL PANEL
R STATION GROUND
S MOTOROLA FM RADIO

VAIHINGEN FKV FLOOR PLAN

Figure 17.

.2


SGT
AN/FRC-162
48VDC
3.3
12.6 Mb/s
VF
MCC
ALARM
SECOND LEVEL MULTIPLEXER
OB79FSC
48VDC
P/O 3.1
1.544 Mb/s
WBDP
P/O 3.6
ALARM
TO PORT 6 AN/FCC-97
BAY 3.8
120VAC
CY1044
4.2
4.3
4.4
4.5
4.6
4.7
VF
ALARM
OB79FSC
TIBL
48VDC
P/O 3.7
50 kb/s
SP
TCF
EQUAL LEVEL PATCH
HDG
SGT
MST
CDF
COMBINED DISTRIBUTION FR
LEGEND
SHIELDED PAIRS, 22 GAUGE
COAX
TWINAX
NOTE: A NUMERAL INSIDE THE SYMBOL INDICATES THE MAXIMUM NUMBER OF CHANNELS AVAILABLE
FULL DUPLEX CHANNEL
PATCH APPEARANCE
CONNECTED TO AN/FTC-31 SWITCH
WBDP WIDEBAND DIGITAL PATCH
TCF TECHNICAL CONTROL FACILITY
SP SPARE CHANNEL
MCC MAINTENANCE COORDINATION CIRCUIT
CDF COMBINED DISTRIBUTION FRAME
EXAMPLE
A
24
VF
B
EXAMPLE MEANS: BETWEEN POINTS A AND B THERE ARE 24 VF FULL DUPLEX CHANNELS CARRIED ON 22 GAUGE SHIELDED PAIRS



VAIHINGEN FKV AND DEB EQUIPMENT INTERFACE

Figure 18.

2.1.1.2 Aviano

(a) Site Data. The Aviano site plan, building floor plan and existing site equipment interface drawings are shown as Figures 19, 20, and 21, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Near southeast side of DEB tower.

Radio configuration - Option 1 (0.5 watt)
(Paragraph 1.2.1.1.1(j))

Orderwire address - 64

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS location - South of DEB tower.

Shelter location - Any convenient location near the MAS.

Minimum MAS height - 30.5 meters (100 feet)/17 sections

Maximum guy radius - 26.5 meters (87 feet)

Antenna polarization - Horizontal

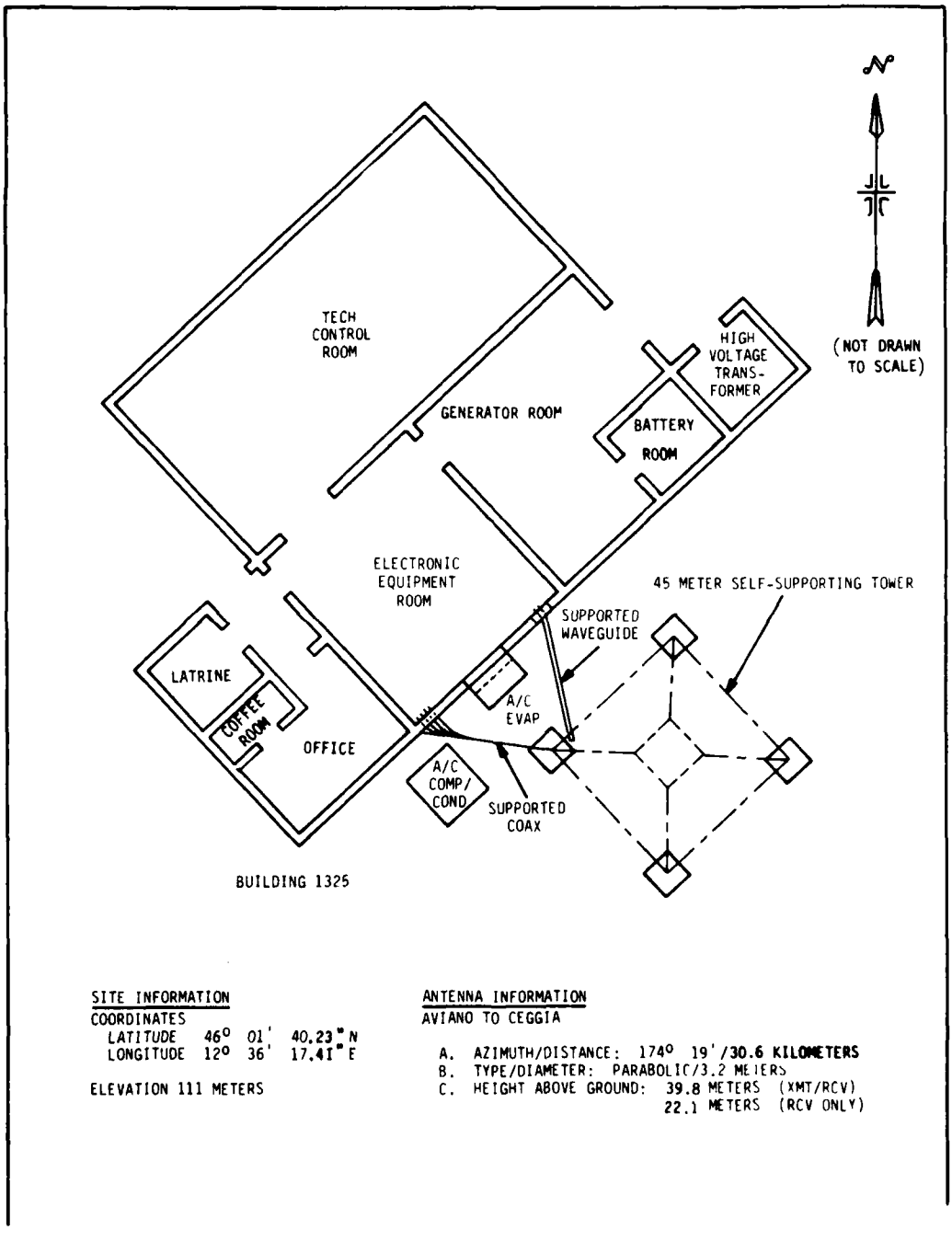
Antenna azimuth - 174 degrees 17 minutes (True)

Radio configuration - Option 1 or 2 (0.5 watt)
(Paragraph 1.2.1.1.1(j))

Orderwire address - 64

(d) Frequencies. The following are transmitter and receiver frequency settings for Aviano:

Transmitter VCO & Bandpass Filter	8292 MHz
Synthesizer Thumbwheel Switches	100150
Receiver Preselector Filter	8398 MHz
Receiver Local Oscillator	8328 MHz



SITE INFORMATION
COORDINATES
LATITUDE 46° 01' 40.23" N
LONGITUDE 12° 36' 17.41" E

ELEVATION 111 METERS

ANTENNA INFORMATION
AVIANO TO CEGGIA

A. AZIMUTH/DISTANCE: 174° 19'/30.6 KILOMETERS
B. TYPE/DIAMETER: PARABOLIC/3.2 METERS
C. HEIGHT ABOVE GROUND: 39.8 METERS (XMT/RCV)
22.1 METERS (RCV ONLY)

Figure 19. Aviano Site Plan

1-1 AC BREAKER PANEL, 220/110VAC
1-2 RECTIFIER CIRCUIT BREAKERS
1-3 RECTIFIER CIRCUIT BREAKERS
1-4 AC TECH POWER PANEL, 120VAC, 60 HZ
1-5 AC POWER PANEL, 120VAC, 60 HZ
1-6 AC POWER PANEL, 220VAC, 60 HZ

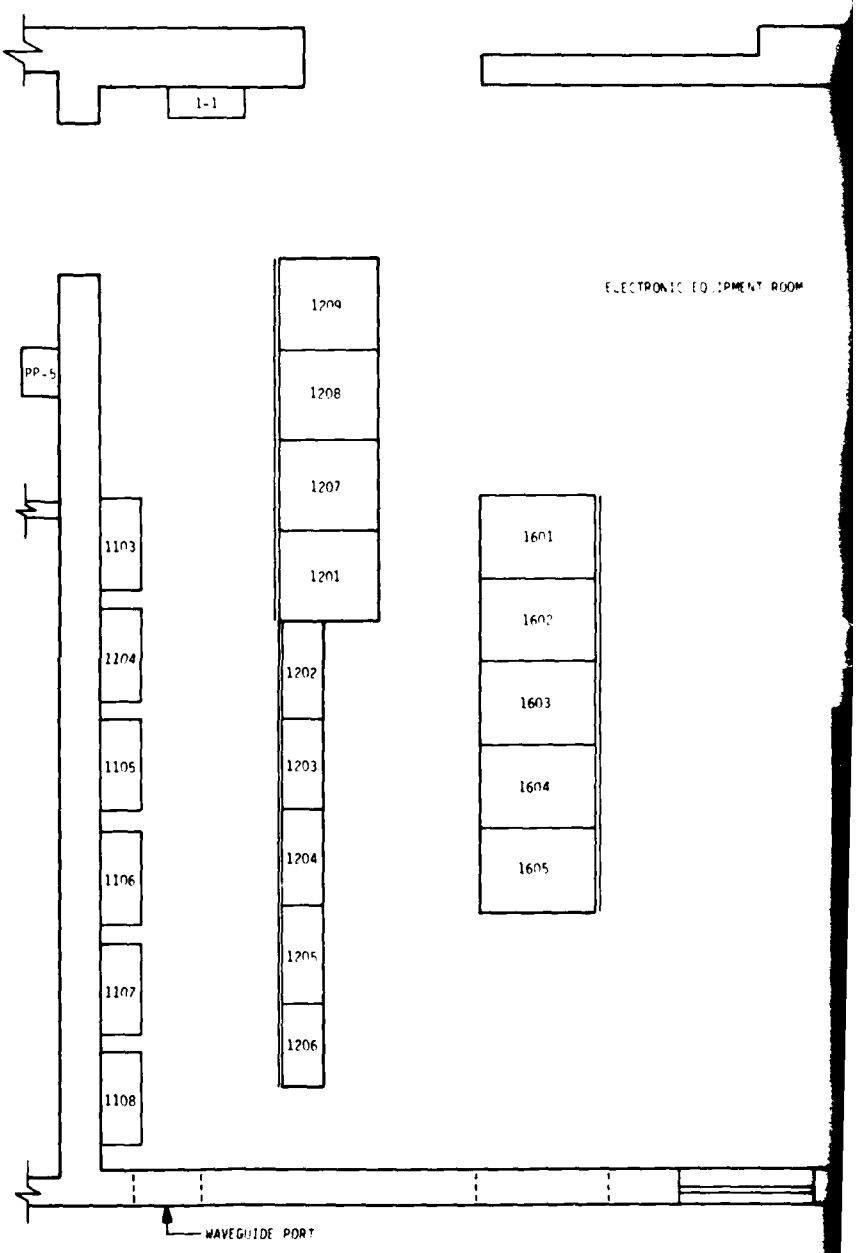
1103 FM12/800 (CEGGIA)
1104 FM12/800 (CEGGIA)
1105 FM12/800 (ODERZO)
1106 FM12/800 (ODERZO)
1107 FM12/800 (PORTO GUARDO)
1108 FM12/800 (PORTO GUARDO)

1201
1202 AN/FCC-32, SPARE SLAVE
1203 AN/FCC-32, (CEGGIA)
1204 AN/FCC-32 (ODERZO)
1205 AN/FCC-32 (PORTO GUARDO)
1206 AN/FCC-32 HIGH FREQUENCY DISTRIBUTION FRAME
1207 VOICE FREQUENCY CARRIER TERMINAL AN/FGC-134
1208 DC EQUIPMENT BAY
1209 48VDC/20 HZ SUPPLY

1309 AN/UGC-32X

1601 TSEC/CY-104A (PCM)
1602
1603
1604
1605 TSEC/CY-104A (PCM)
1606 RECTIFIER
1607 TDM, 8 PORT
1608 RADIO MISCELLANEOUS BAY (ORDERWIRE MUX)
1609 AN/FRC-162(V)
1610 COMPRESSOR/DEHYDRATOR

PP-2 220V POWER PANEL
PP-5 UTILITY POWER DISTRIBUTION PANEL



AVIANO DEB FL

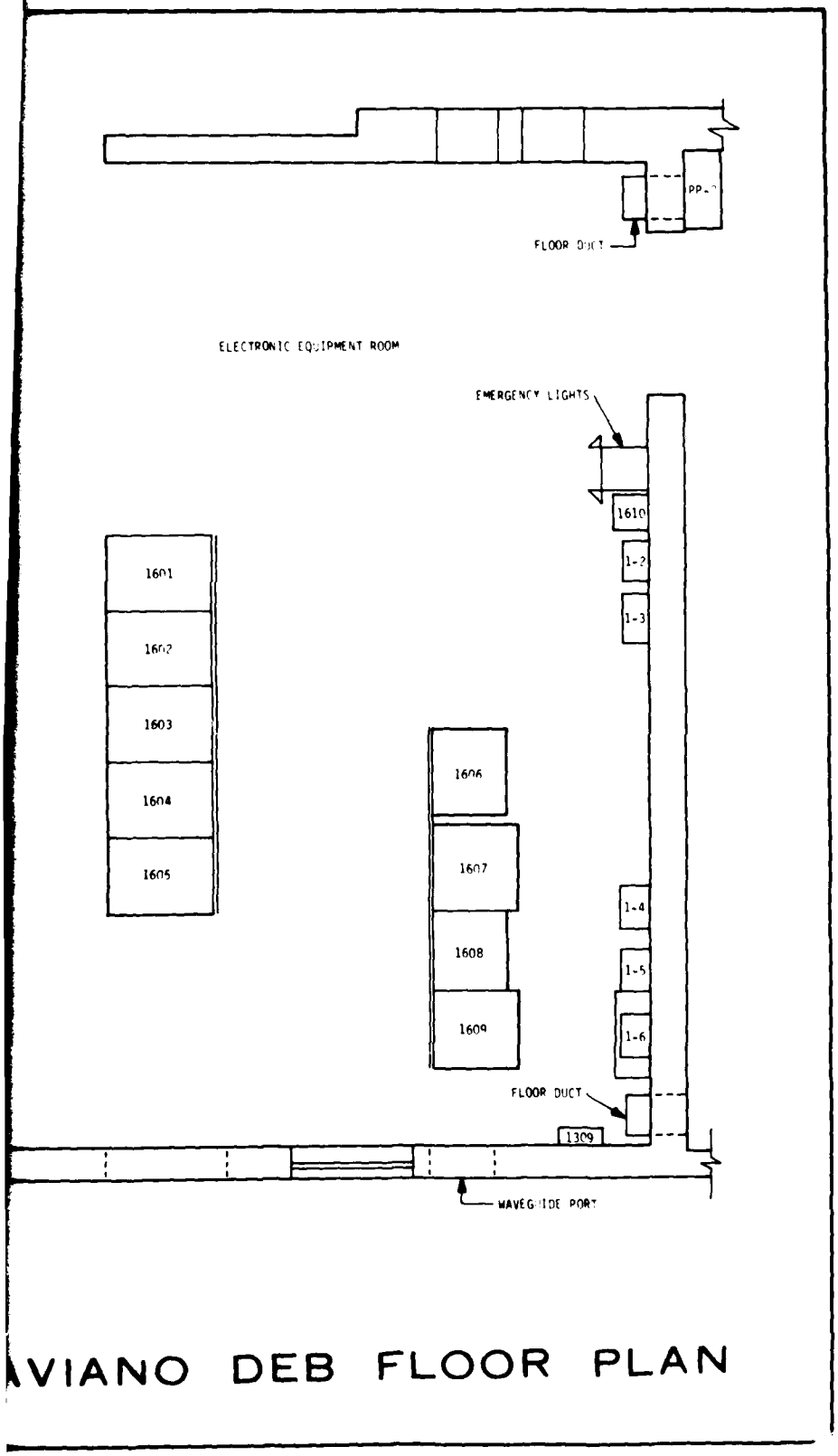
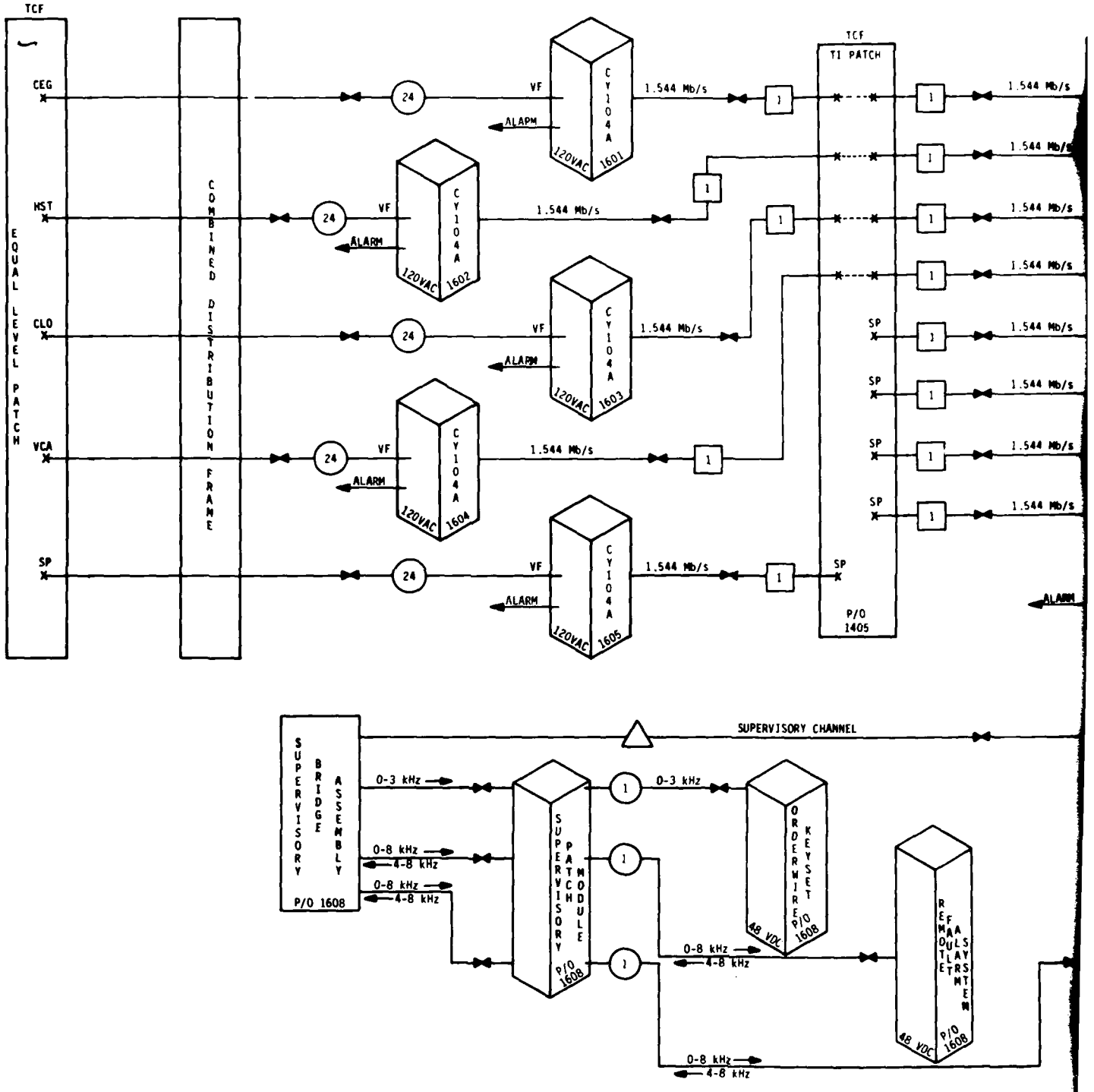
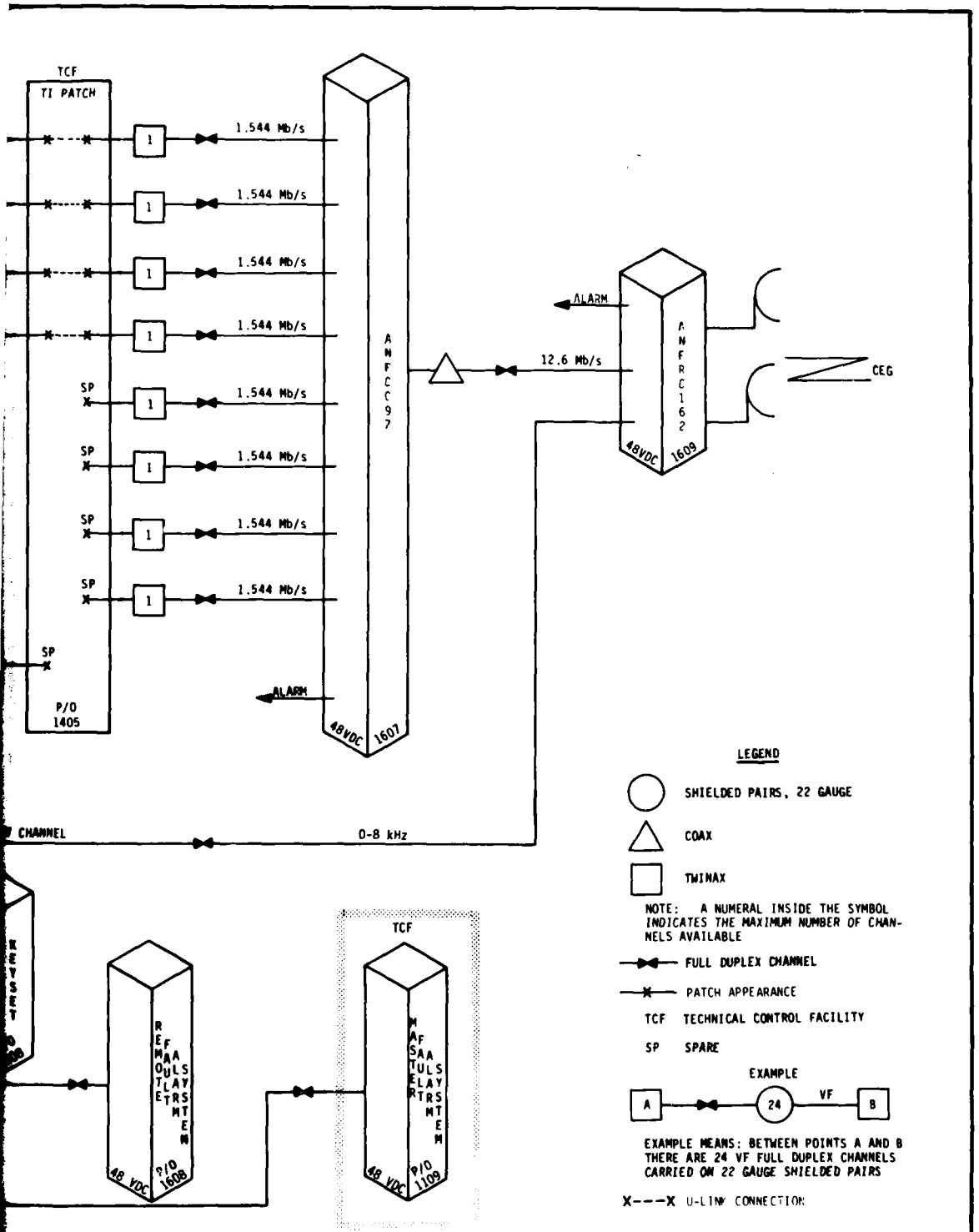

FLOOR DUCT
ELECTRONIC EQUIPMENT ROOM
EMERGENCY LIGHTS
1610
1-2
1-3
1601
1602
1603
1604
1605
1606
1607
1608
1609
1-4
1-5
1-6
FLOOR DUCT
1309
WAVEGUIDE PORT
VIANO DEB FLOOR PLAN

Figure 20.



AVIANO DEE



AVIANO DEB EQUIPMENT INTERFACE

Figure 21.

2.1.1.3 Vicenza

(a) Site Data. The Vicenza site plan, building floor plan and existing site equipment interface drawings are shown as Figures 22, 23, and 24, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Adjacent to DEB tower.

Radio configuration - Option 1 (0.5 watt)
(Paragraph 1.2.1.1.1(j))

Orderwire address - 63

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS location - Motor pool parking lot.

Shelter location - Any convenient location near MAS.

Minimum MAS height - 23.5 meters (77 feet)/13 sections

Maximum guy radius - 17.1 meters (56 feet)

Antenna polarization - Horizontal

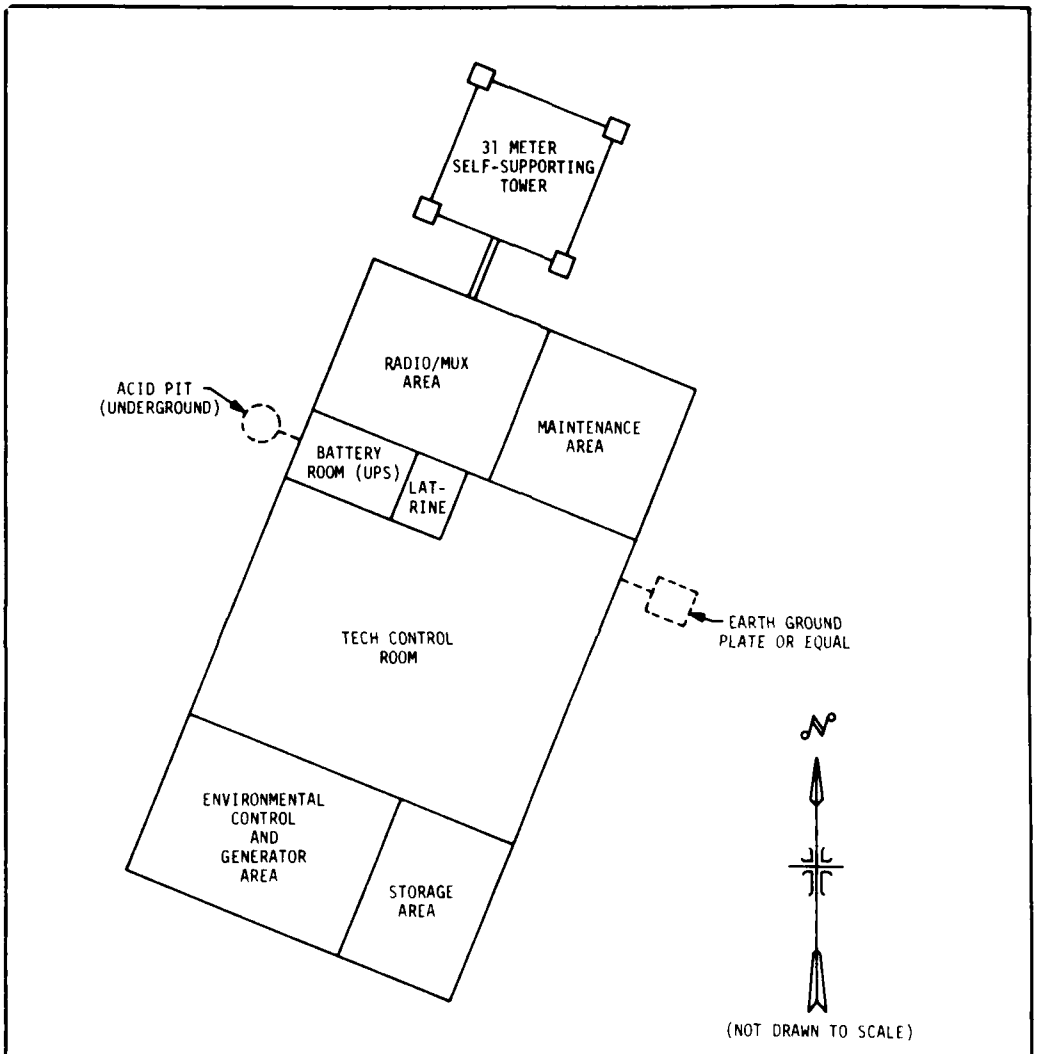
Antenna azimuth - 161 degrees 59 minutes (True)

Radio configuration - Option 1 or 2 (0.5 watt)
(Paragraph 1.2.1.1.1(j))

Orderwire address - 63

(d) Frequencies. The following are transmitter and receiver frequency settings for Vicenza:

Transmitter VCO & Bandpass Filter	8398 MHz
Synthesizer Thumbwheel Switches	101475
Receiver Preselector Filter	8292 MHz
Receiver Local Oscillator	8222 MHz



SITE INFORMATION
COORDINATES
LATITUDE 45° 32' 25" N
LONGITUDE 11° 34' 53" E

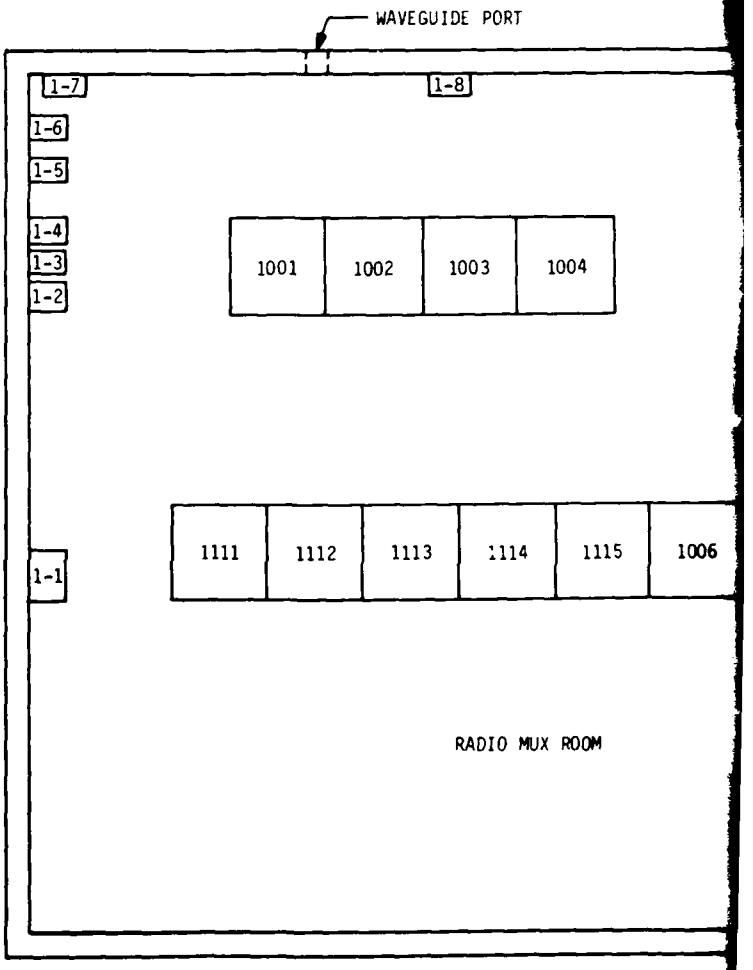
ELEVATION 30 METERS

ANTENNA INFORMATION
VICENZA TO MT VENDA
A. AZIMUTH/DISTANCE: 161° 59' 10"/26.4 KILOMETERS
B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
C. HEIGHT ABOVE GROUND: 29.6 METERS (XMT/RCV)
20.4 METERS (RCV ONLY)

Figure 22. Vicenza Site Plan

1-1 TECHNICAL POWER PANEL 50 AMP AC
1-2 100 AMP, 48VDC
1-3 DEHYDRATOR
1-4 COMPRESSOR DEHYDRATOR, 220VAC
1-5 TRANSFORMER, 1KVA/120VAC, 50HZ
1-6 CIRCUIT POWER PANEL
1-7 EQUIPMENT GROUND
1-8 SIGNAL GROUND BOX
1-9 TACTICAL INTERFACE

1001 AN/FRC-162
1002 RADIO MISCELLANEOUS BAY
1003 SECOND LEVEL MULTIPLEXER
1004 T1 PATCH & TEST BAY
1006 TSEC/CY-104A
1111 (COLTANO)
1112 (AVIANO)
1113 (HOHENSTADT)
1114 (MT VENDA)
1115 TSEC/CY-104A (SPARE)



VICENZA DE

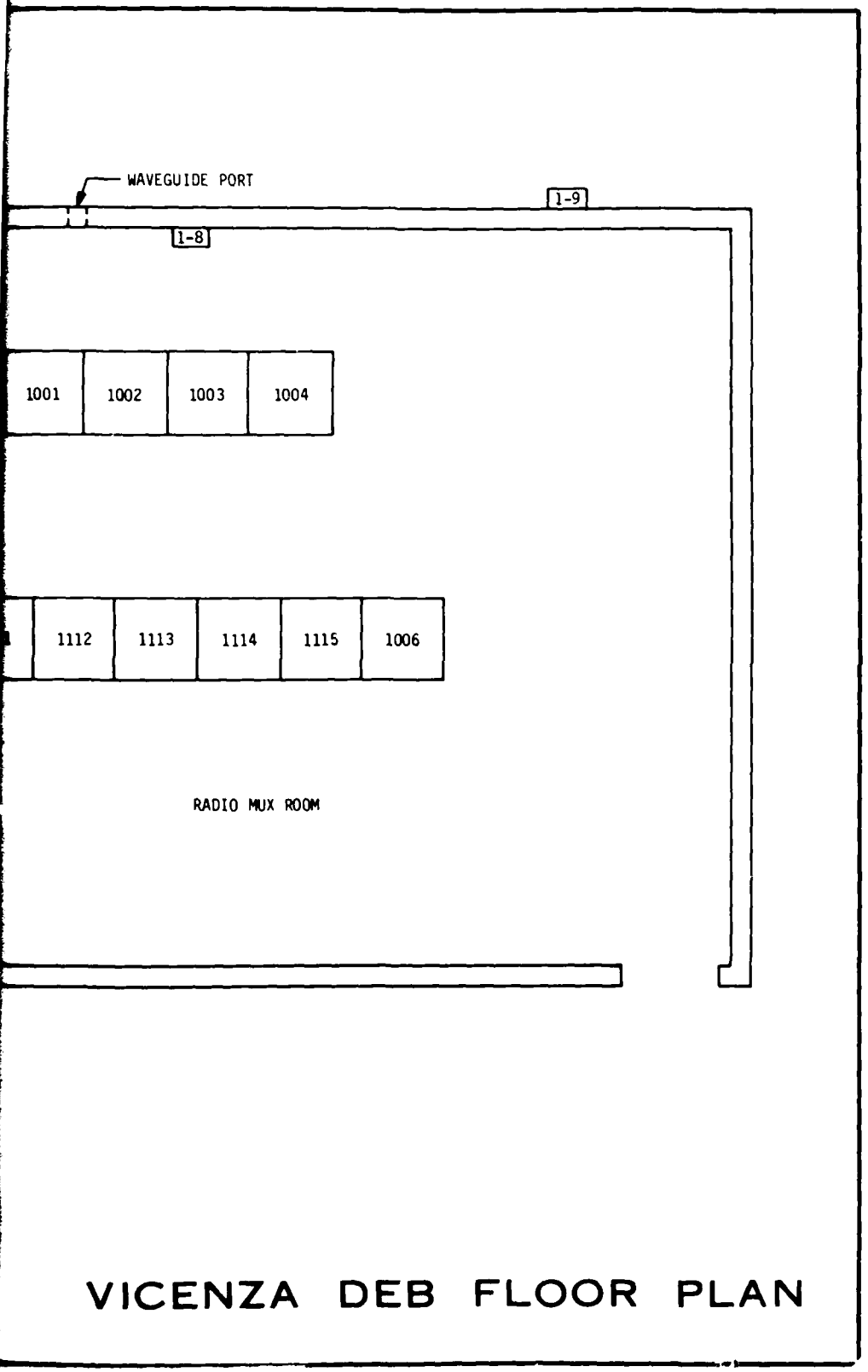
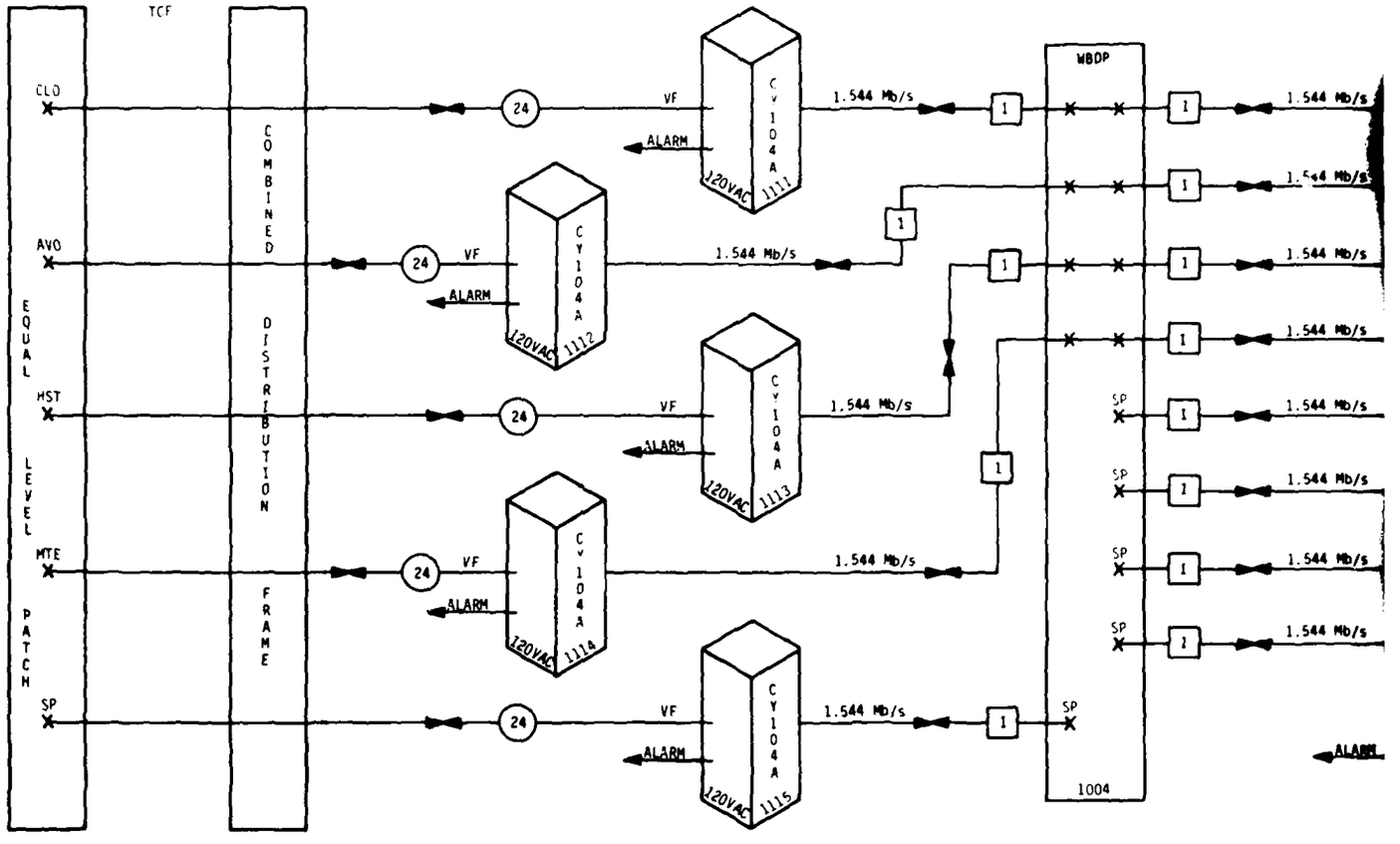
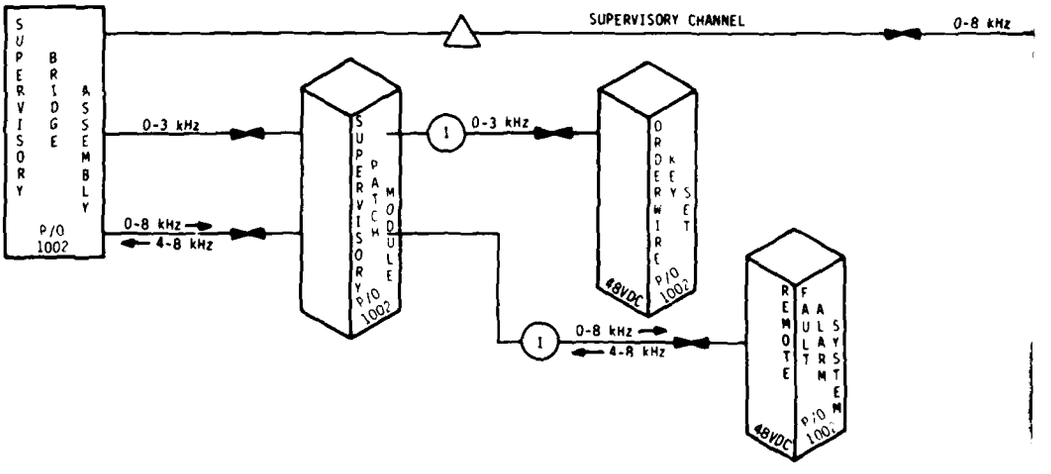
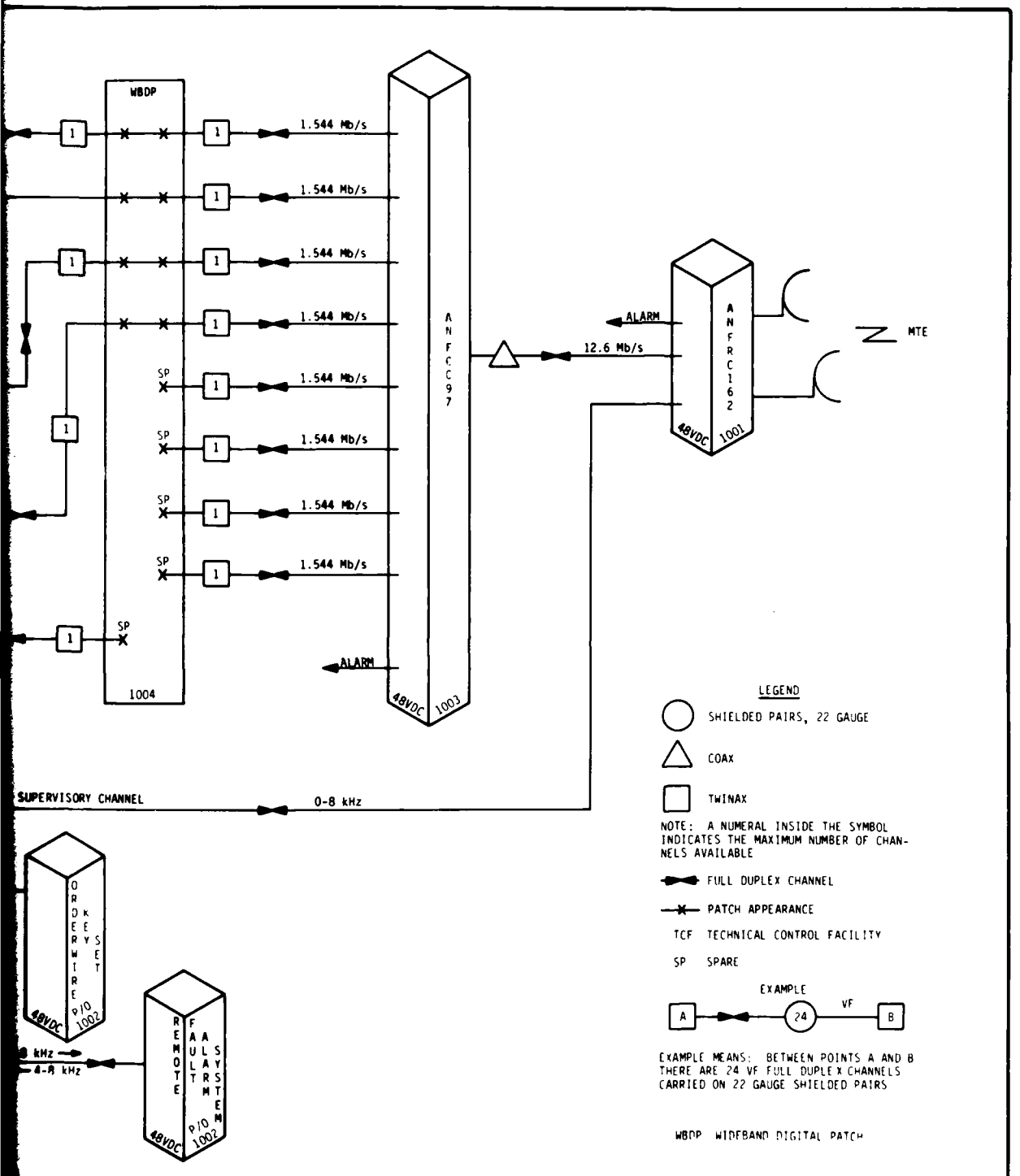

WAVEGUIDE PORT
1-9
1-8
1001
1002
1003
1004
1112
1113
1114
1115
1006
RADIO MUX ROOM
VICENZA DEB FLOOR PLAN

Figure 23.





VICENZA DEB



VICENZA DEB EQUIPMENT INTERFACE

Figure 24.

2.1.1.4 Coltano

(a) Site Data. The Coltano site plan, building floor plan and existing site equipment interface drawings are shown as Figures 25, 26, and 27, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Adjacent to west side of DEB tower.

Radio configuration - Option 1 (0.5 watt)
(Paragraph 1.2.1.1.1(j))

Orderwire address - 15

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS location - West of DEB tower.

Shelter location - Any convenient location near MAS.

Minimum MAS height - 17 meters (55 feet)/9 sections

Maximum guy radius - 15.25 meters (50 feet)

Antenna polarization - Horizontal

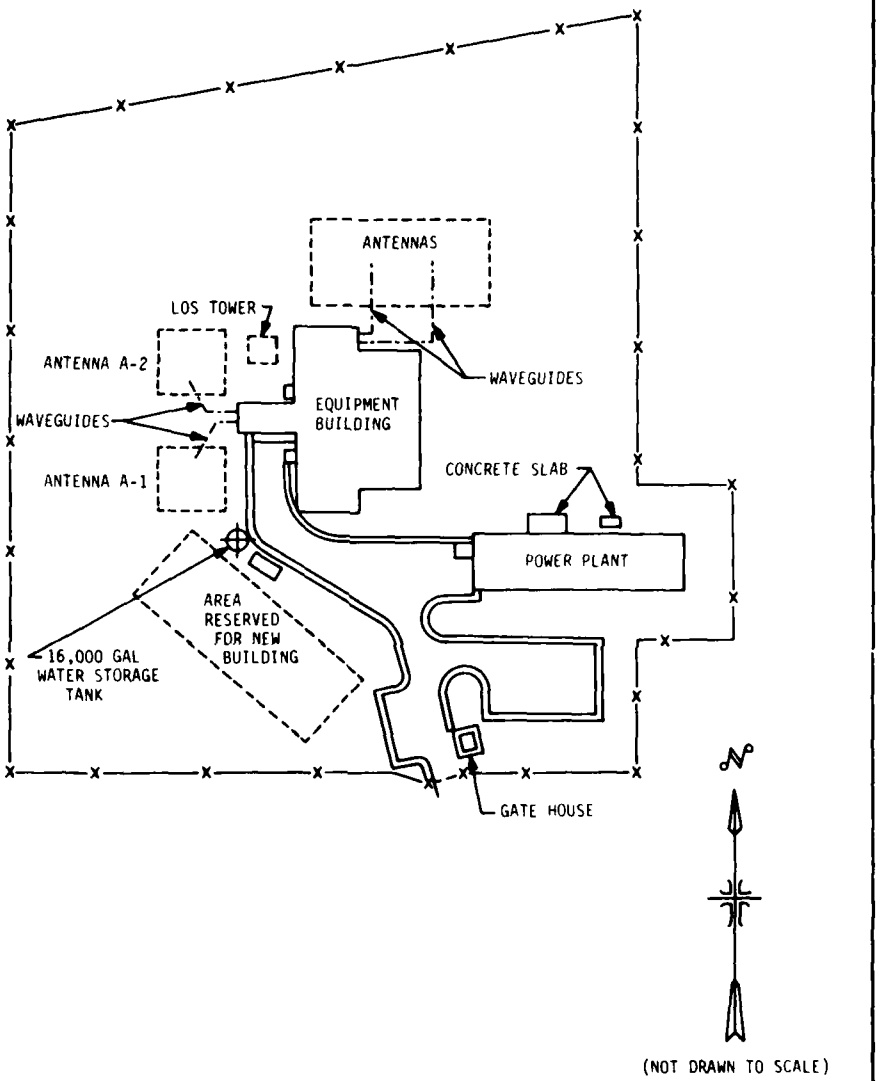
Antenna azimuth - 49 degrees 43 minutes (True)

Radio configuration - Option 1 or 2 (0.5 watt)
(Paragraph 1.2.1.1.1(j))

Orderwire address - 15

(d) Frequencies. The following are transmitter and receiver frequency settings for Coltano:

Transmitter VCO & Bandpass Filter	8297.5 MHz
Synthesizer Thumbwheel Switches	100219
Receiver Preselector Filter	8107.5 MHz
Receiver Local Oscillator	8037.5 MHz



SITE INFORMATION
COORDINATES
LATITUDE 43° 39' 28" N
LONGITUDE 10° 24' 19" E

ELEVATION -0.5 METERS

ANTENNA INFORMATION
COLTANO TO MT SERRA
A. AZIMUTH/DISTANCE: 51° 25' 16.4 KILOMETERS
B. TYPE/DIAMETER: PARABOLIC/1.9 METERS
C. HEIGHT ABOVE GROUND: 24.4 METERS (XMT/RCV)
14.3 METERS (RCV ONLY)

Figure 25. Coltano Site Plan

1-2 DEHYDRATOR
1-3 TRANSFORMER, 20KVA
1-4 PRIMARY CRITICAL PANEL
1-5 CRITICAL PANEL #1
1-6 CRITICAL PANEL #2
1-7 AUTOMATIC TRANSFER SWITCH
1-8 TECHNICAL POWER PANEL #1
1-10 TECHNICAL POWER PANEL #2
1-11 CRITICAL AC POWER PANEL
1-12 AUTOVON BATTERY DC POWER PANEL
1-13 PROTECTOR BLOCK PANEL
1-14 TACTICAL INTERFACE PANEL

1100 AMERICAN FORCES RADIO COMMUNICATIONS SYSTEM TRANSMITTER
1100A AMERICAN FORCES RADIO COMMUNICATIONS SYSTEM MONITOR
1101 MICROWAVE RADIO, ITALIAN
1102 12 CHANNEL MUX, ITALIAN
1107 AN/FRC-113 1KW POWER AMPILFIER
1108 AN/FRC-113 1KW POWER AMPILFIER
1110 EXCITER
1111 EXCITER
1113 RECEIVER
1115 CENTRAL EQUIPMENT CABINET
1117 RECEIVER

1201 DEHYDRATOR
1202 AN/FRC-162 MICROWAVE RADIO
1203 RADIO MISCELLANEOUS BAY
1204 AN/FCC-97 TDM MUX
1205 ARMY T1 PATCH BAY
1206 RESERVED FOR T1 TEST BAY
1207 TSEC/CY-104A PCM DIGROUP #1 (FELDBERG-MT VERGINE)
1208 #2 (FELDBERG)
1209 #3 (DONNERSBERG)
1210 #4 (LANGERKOPF)
1211 #5 (STUTTGART)
1212 #6 (MT CORNA)
1213 #7 (AVIANO)
1214 #8 (VICENZA)
1215 TSEC/CY-104A PCM DIGROUP #9 (SPARE)

1301 GROUP PILOT ALARM (MT CIMONE)
1307 GROUP PILOT ALARM (MT CIMONE)
1308 V60/FU SUPERGROUP #1 (MT CIMONE)
1309 V60/FU SUPERGROUP #2 (MT CIMONE)
1310 EM12O/40D TRANSMITTER (MT CIMONE)
1311 EM12O/40D RECEIVER (MT CIMONE)
1312 SUPERVISORY (SPARE)

1401 VZ-12 TERMINAL BAY SUPERGROUP 2, GROUP 2 (MT CIMONE)
1402 SUPERGROUP 2, GROUP 3 (MT CIMONE)
1403 SPARE (MT CIMONE)
1404 A*GP (MT CIMONE)
1409 SUPERGROUP 1, GROUP 3 (MT CIMONE)
1410 SUPERGROUP 1, GROUP 4 (MT CIMONE)
1411 SUPERGROUP 1, GROUP 5 (MT CIMONE)
1412 VZ-12 TERMINAL BAY SUPERGROUP 1, GROUP 1 (MT CIMONE)

1501 AN/FCC-41 COMMON EQUIPMENT
1502 COMBINATION AND TEST
1503 CHAN SUPERGROUP 1, GROUP 1, GROUP 2
1504 CHAN SUPERGROUP 1, GROUP 3, GROUP 4
1505 AN/FCC-41 CHAN SUPERGROUP 1, GROUP 5, SUPERGROUP 2, GROUP 5

1701 MONITOR
1702 ALARM
1703 AN/FCC-32
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714 AN/FCC-32

1901 CONSOLE REMOTE EQUIPMENT

2001 VF CONDITIONING, 5 RACKS
2010 AN/FSC-34
2014 TELETYPEWRITER RELAYS

2101 COMBINATION DISTRIBUTION FRAME

2201 TECHNICAL CONTROL FACILITY POWER SUPPLIES
2202 PRIMARY PATCH
2203 PRIMARY PATCH
2204 PRIMARY PATCH
2205 TEST EQUIPMENT BAY
2206 TEST EQUIPMENT BAY
2207 PRIMARY PATCH
2208 TECHNICAL CONTROL FACILITY PRIMARY PATCH
2209 AUTOVON VF PATCH PANEL
2210 AUTOVON VF PATCH PANEL
2211 AUTOVON VF PATCH PANEL
2213 GROUP PATCH
2214 GROUP PATCH

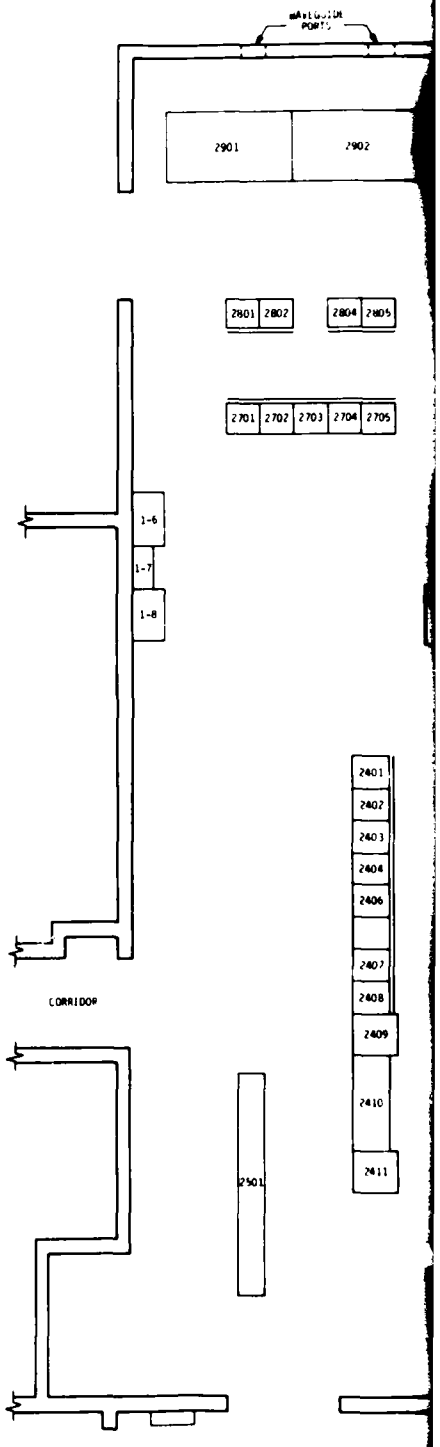
2401 TECHNICAL CONTROL FACILITY EQUAL LEVEL PATCH
2402
2403
2404 EQUAL LEVEL PATCH
2405 TEST EQUIPMENT BAY
2406 TEST EQUIPMENT BAY
2407 EQUAL LEVEL PATCH
2408 TECHNICAL CONTROL FACILITY EQUAL LEVEL PATCH
2409 AUTOVON VF PATCH PANEL
2410 AUTO QUAL MON REPORTING SYSTEM CONSOLE
2411 AUTO QUAL MON REPORTING SYSTEM PRINTER

2501 AUTO QUAL MON REPORTING SYSTEM PROCESSOR

2701 ORDERWIRE AND BASEBAND PATCH (LIMBARA)
2702 RECEIVER (LIMBARA)
2703
2704
2705 RECEIVER (LIMBARA)

2801 PARAMETRIC AMPLIFIER (LIMBARA)
2802 EXCITER (LIMBARA)
2804 EXCITER (LIMBARA)
2805 PARAMETRIC AMPLIFIER (LIMBARA)

2901 POWER AMPLIFIER, 10KW (LIMBARA)
2902 POWER AMPLIFIER, 10KW (LIMBARA)
2910 ACAS RELAY RACK
2911 ACAS-RSOMD (DISPLAY)



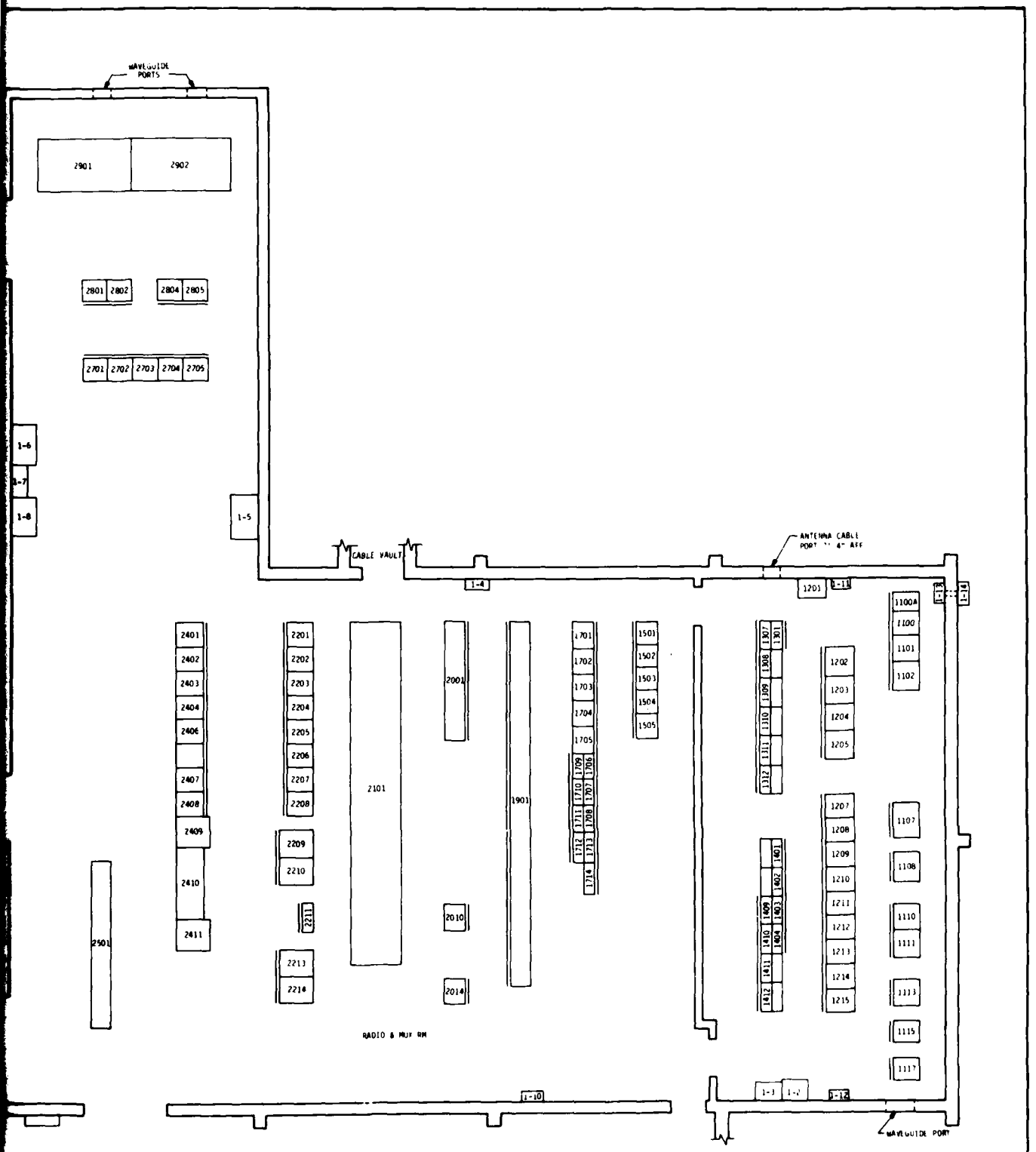
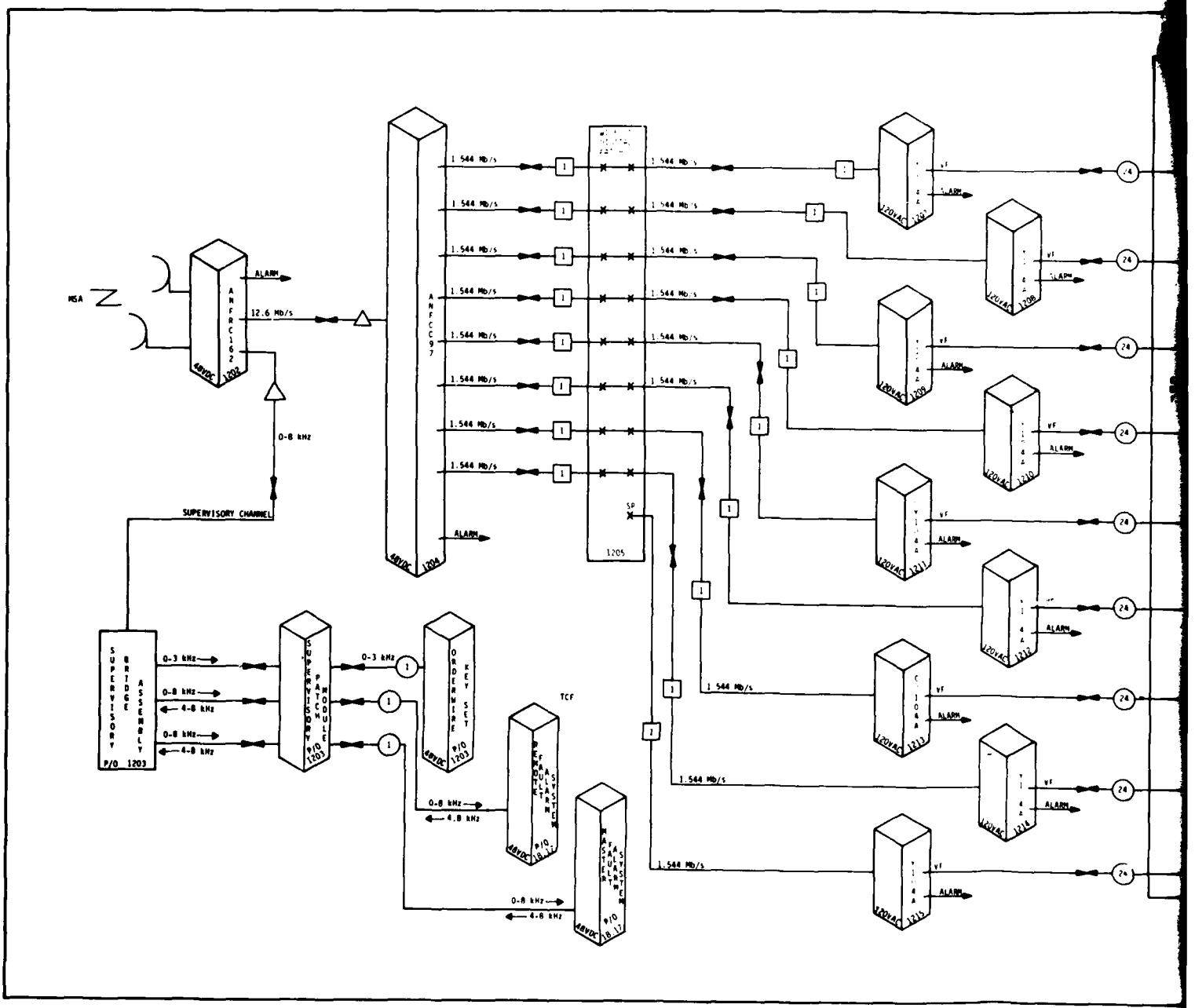


Figure 26. COLTANO DEB FLOOR PLAN



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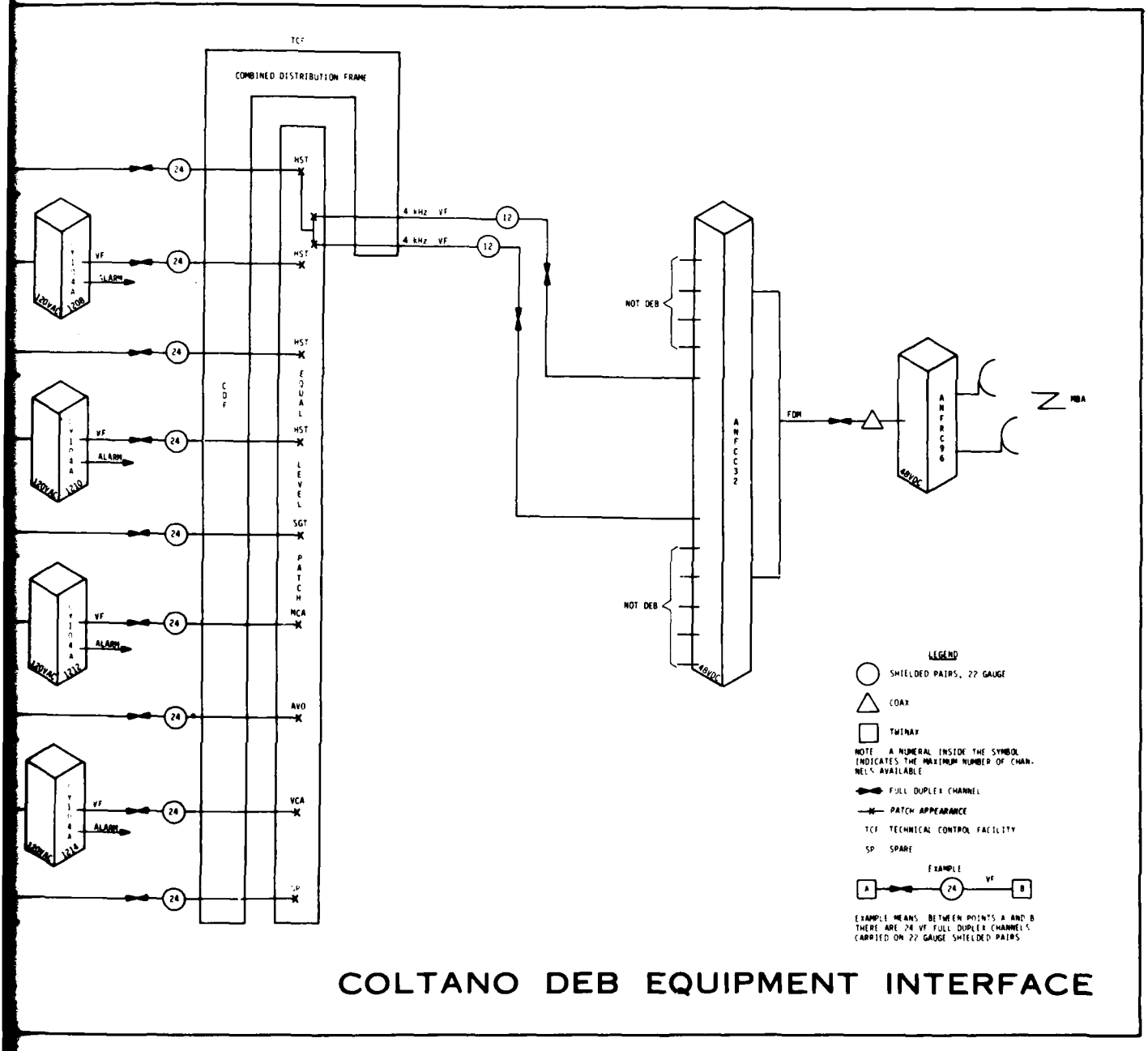


COLTANO DEB EQUIPMENT INTERFACE

Figure 27.

2.1.1.5 Hohenstadt

Listed below is major equipment required for temporary restoration of Hohenstadt:

TCM-604B Radio	2 required
AN/FCC-97 TDM 2nd Level MUX	2 required
TSEC/CY-104A PCM 1st Level MUX	4 required

The following are Equipment Shelter patch connections for Hohenstadt (Radio #1 is on the Zugspitze link):

Baseband -

FROM	CONNECTION	TO
Radio #1		2nd Level MUX #1
XMIT	U-Link	XMIT
RCV	U-Link	RCV
Radio #2		2nd Level MUX #2
XMIT	U-Link	XMIT
RCV	U-Link	RCV

T1 - T1 patch connections will depend on digroup priority assignments. There is a limited number (four) of CY-104A first level multiplexers in the Type I shelter and the number of CY-104A units connected in Hohenstadt's fixed plant configuration is 12 (as of the date of this publication).

(a) Site Data. The Hohenstadt site plan, building floor plan and existing site equipment interface drawings are shown as Figures 28, 29, and 30, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Parking area adjacent to DEB tower.

Radio configurations - (Paragraph 1.2.1.1.1(j))
Hohenstadt to Vaihingen - Option 3 (5 watts)
Hohenstadt to Zugspitze - Option 3 (5 watts)

Orderwire address - 83

Frequencies - Set the transmitter VCO and bandpass filter, synthesizer thumbwheel switches, receiver preselector and receiver LO, for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Vaihingen	8218.5	99231	8379.5	8309.5
Zugspitze	8148.5	98356	8309.5	8239.5

(c) Mast Antenna Subsystem. If erection of the MAS is required, a direct link from Hohenstadt to Vaihingen cannot be reestablished due to the 100 foot (30.5 meter) antenna height limitation of the MAS and consequent path blockage by nearby hills. The suggested alternative is to utilize a Type I A Contingency Package as a simple repeater between Hohenstadt and Vaihingen, positioned on a high point in the ridge of hills northwest of Hohenstadt. The CIP-67 NATO site on the hill west of the village of Eselhof is a prime candidate. The site is within about 200 meters of the Vaihingen-Hohenstadt path, at an altitude of 821 meters, and roughly 2700 meters, line-of-sight, from Hohenstadt. (Thus, the DEB antennas at Vaihingen should not require realignment.) Access to the site is by a macadam road from Eselhof. The site has a concrete tower approximately 60 meters high, with a platform around its midpoint. Permission for emergency access should be obtained and point of contact listed in the detailed reconstitution plan. Assuming permission is granted to utilize the NATO site, the following will apply:

MAS location (at Hohenstadt) -
Parking area northeast of DEB tower.

Shelter location - Any convenient location near MAS.

Minimum MAS height - 30.5 meters (100 feet)/17 sections

Maximum guy radius - 26.5 meters (87 feet)

Antenna polarization -
Hohenstadt to Zugspitze - Horizontal
Hohenstadt to Repeater - Vertical
Repeater to Vaihingen - Vertical

Antenna azimuths - (Magnetic)
Hohenstadt to Zugspitze - 138 degrees 32 minutes
Hohenstadt to Repeater - 303 degrees 38 minutes

Repeater to Hohenstadt - 123 degrees 37 minutes
Repeater to Vaihingen - 295 degrees 10 minutes

Repeater (Type I A) location - CIP-67 NATO site tower, west of the village of Eselhof.
48 degrees 33 minutes 50 seconds N.
09 degrees 38 minutes 33 seconds E.

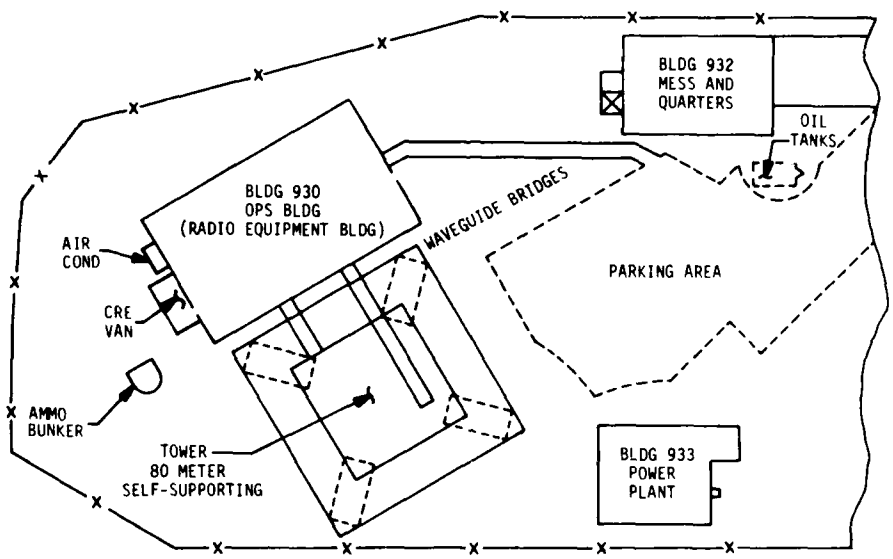
Radio configurations - (Paragraph 1.2.1.1.1(j))
Hohenstadt to Zugspitze - Option 3 or 4 (5 watts)
Hohenstadt to Repeater - Option 1 (0.5 watt)
Add 30 dB coax attenuator between transmitter and circulator.
Repeater to Hohenstadt - Type I A (0.5 watt)
Add 30 dB coax attenuator between transmitter and circulator.
Repeater to Vaihingen - Type I A w/Solid State Amplifier (2 watts)

Orderwire address - 83

Frequencies - Set the transmitter VCO and bandpass filter, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Repeater to Hohenstadt	_____	_____	_____	_____
Hohenstadt to Repeater	_____	_____	_____	_____
Repeater to Vaihingen	8218.5	99231	8379.5	8309.5
Hohenstadt to Zugspitze	8148.5	98356	8309.5	8239.5

Note: Frequencies and thumbwheel settings for the Hohenstadt/repeater link must be determined. The Vaihingen and Zugspitze radio settings correspond to the radio frequencies at those sites.



(NOT DRAWN TO SCALE)

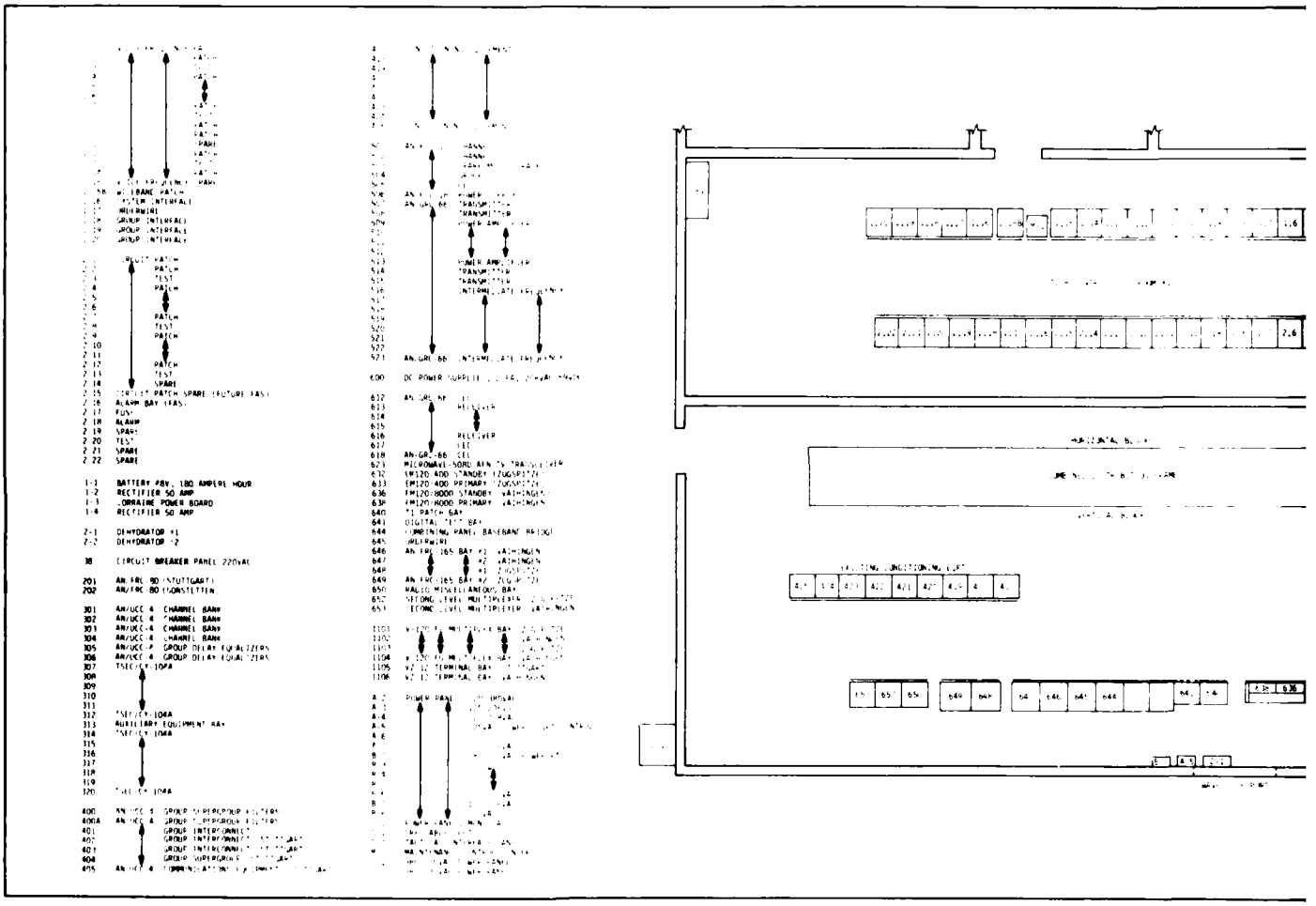
SITE INFORMATION
COORDINATES
LATITUDE 48° 33' 02" N
LONGITUDE 09° 40' 22" E

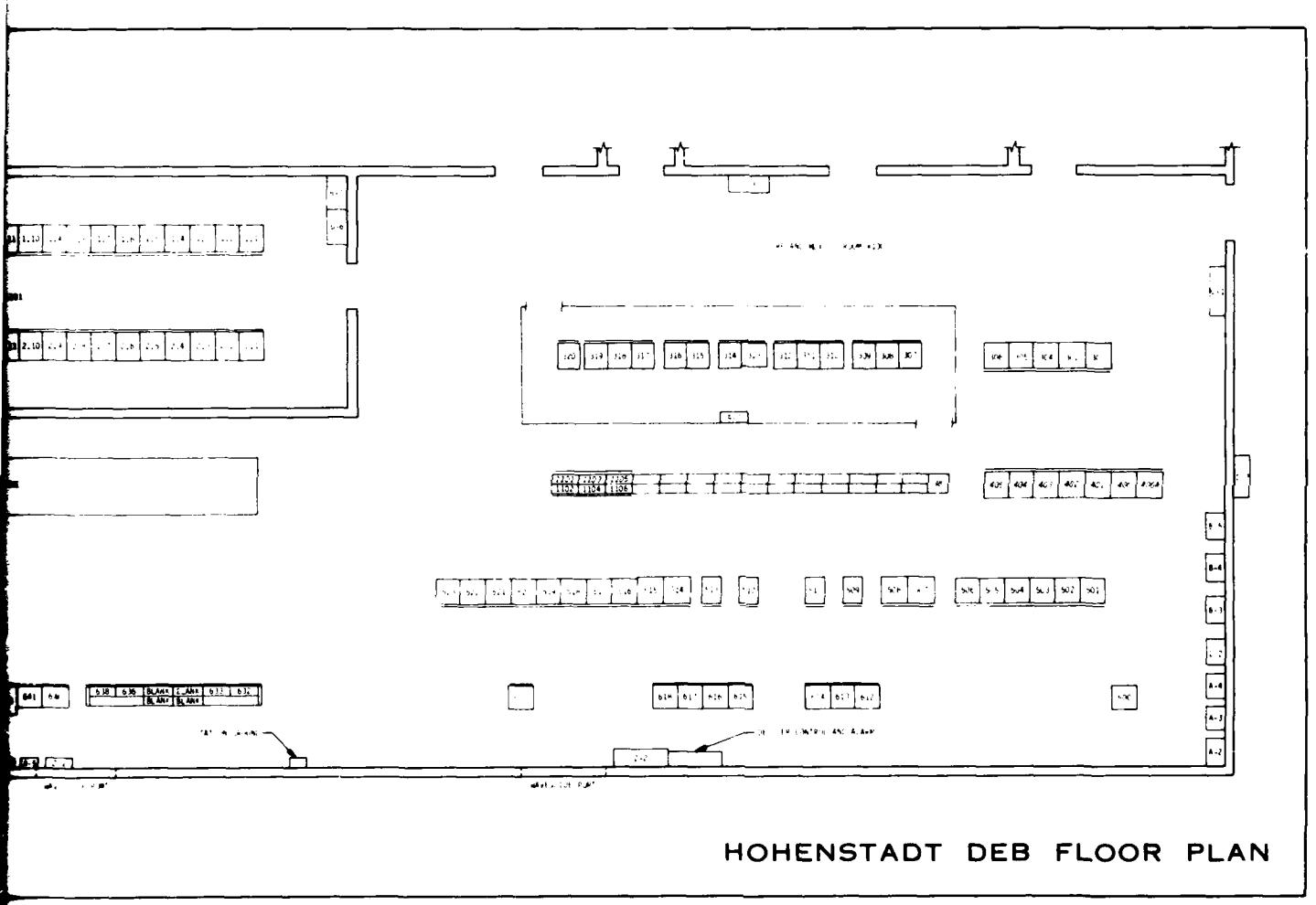
ELEVATION 812 METERS

ANTENNA INFORMATION
1. HOHENSTADT TO VAIHINGEN
   A. AZIMUTH/DISTANCE: 295° 34'/41.8 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/1.8 METERS
   C. HEIGHT ABOVE GROUND: 63.4 METERS (RCV ONLY)
      66.4 METERS (XMT/RCV)

2. HOHENSTADT TO ZUGSPITZE
   A. AZIMUTH/DISTANCE: 141° 29'/159.3 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/3.0 METERS
   C. HEIGHT ABOVE GROUND: 12.2 METERS (XMT/RCV)
      73.8 METERS (RCV ONLY)

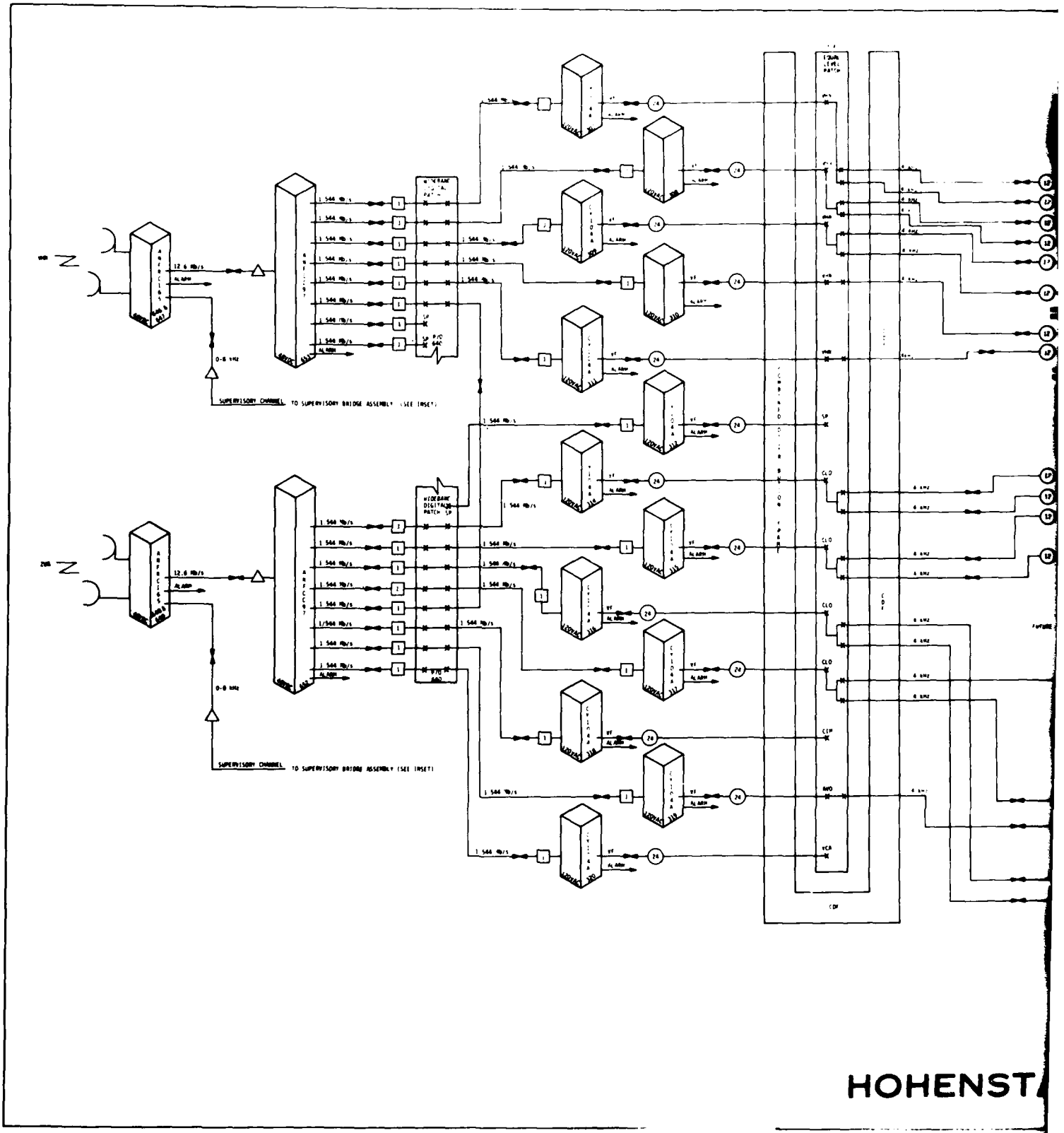
Figure 28. Hohenstadt Site Plan

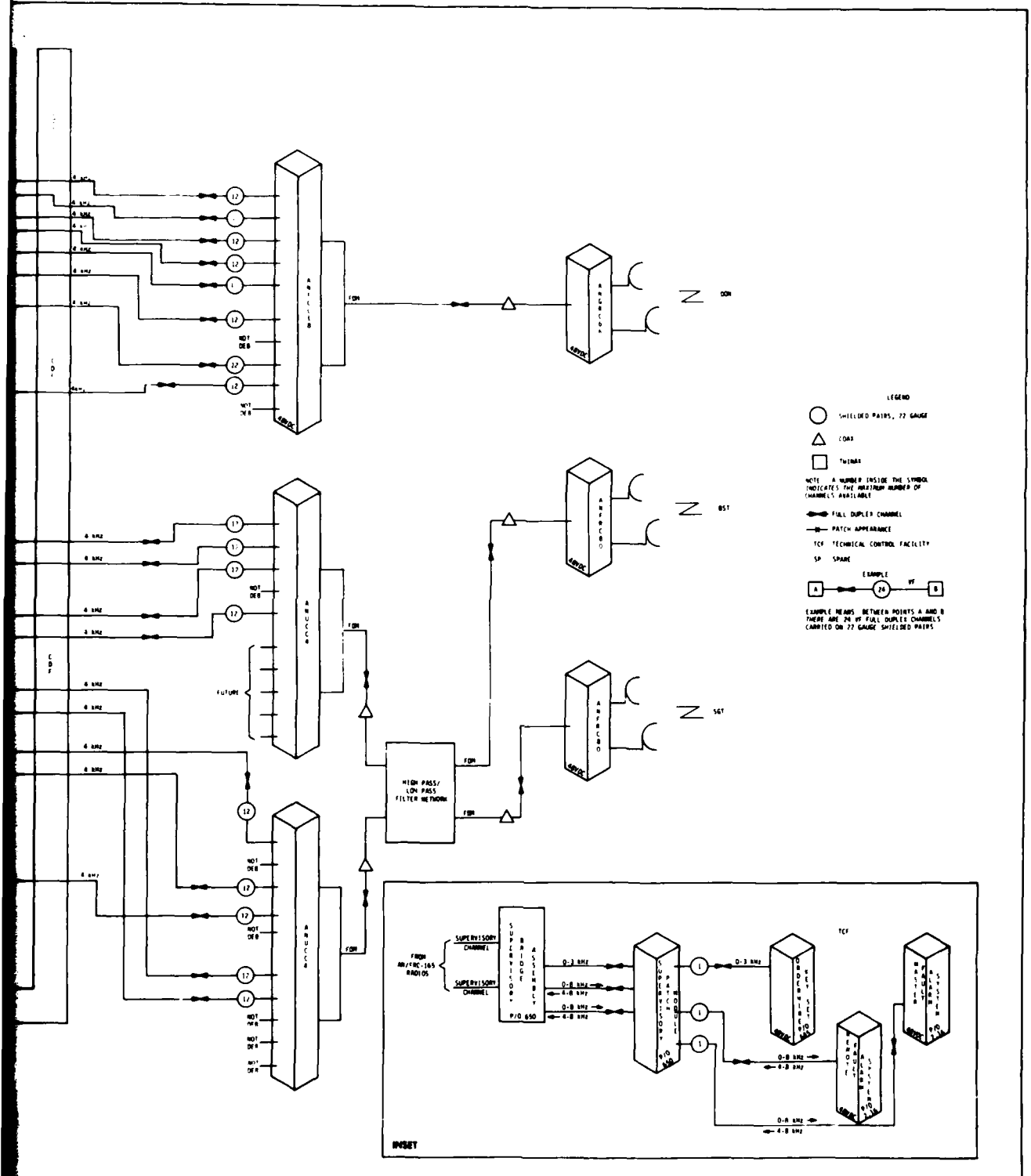




HOHENSTADT DEB FLOOR PLAN

Figure 29.





HOHENSTADT DEB EQUIPMENT INTERFACE

Figure 30.

2.1.2 Accessible Simple Repeaters

Basic configuration of the Type I Contingency Package for restoration of a simple repeater site is shown in Figure 6 (page 18).

Listed below is major equipment, common to each DEB I repeater site, required for temporary restoration:

TCM-604B Radio	2 required
AN/FCC-97 TDM 2nd Level MUX	2 required
TSEC/CY-104A PCM 1st Level MUX	2 required (Ceggia only)

The following are equipment shelter patch connections for a simple repeater:

Baseband-

FROM	CONNECTION	TO
Radio #1		2nd Level MUX #1
XMIT	U-Link	XMIT
RCV	U-Link	RCV
Radio #2		2nd Level MUX #2
XMIT	U-Link	XMIT
RCV	U-Link	RCV

T1-

FROM	CONNECTION	TO
2nd Level MUX #1		2nd Level MUX #2
XMIT #1	U-Link	RCV #1 (Mt. Serra only
RCV #1	U-Link	XMIT #1) (See below)
XMIT #2	U-Link	RCV #2
RCV #2	U-Link	XMIT #2
XMIT #3	U-Link	RCV #3
RCV #3	U-Link	XMIT #3
XMIT #4	U-Link	RCV #4
RCV #4	U-Link	XMIT #4
XMIT #5	U-Link	RCV #5
RCV #5	U-Link	XMIT #5

FROM	CONNECTION	TO
2nd Level MUX #1		2nd Level MUX #2
XMIT #6	U-Link	RCV #6
RCV #6	U-Link	XMIT #6
XMIT #7	U-Link	RCV #7
RCV #7	U-Link	XMIT #7
XMIT #8	U-Link	RCV #8
RCV #8	U-Link	XMIT #8

NOTE: The above T1 patch connections are identical for Ceggia and Mt. Serra with one exception -- VF channel breakout at Ceggia will require the following variation:

T1-

FROM	CONNECTION	TO
2nd Level MUX #1		1st Level MUX #1
XMIT #1	Patch Cord	XMIT
RCV #1	Patch Cord	RCV
2nd Level MUX #2		1st Level MUX #2
XMIT #1	Patch Cord	XMIT
RCV #1	Patch Cord	RCV

VF patch requirements for Ceggia will be subject to the most up-to-date information and should be included in the O&M reconstitution plan.

2.1.2.1 Ceggia

(a) Site Data. The Ceggia site plan, building floor plan and existing site equipment interface drawings are shown as Figures 31, 32, and 33, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Concrete pad adjacent to site building

Radio configuration - (Paragraph 1.2.1.1.1(j))
Ceggia to Aviano - Option 1 (0.5 watt)
Ceggia to Mt. Venda - Option 3 (5 watts)

Orderwire address - 61

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS location - Front (west) of site building.

Shelter location - Concrete pad in front of site building.

Minimum MAS height - 30.5 meters (100 feet)/17 sections

Maximum guy radius - 26.5 meters (87 feet)

Antenna polarization - Horizontal (Both links)

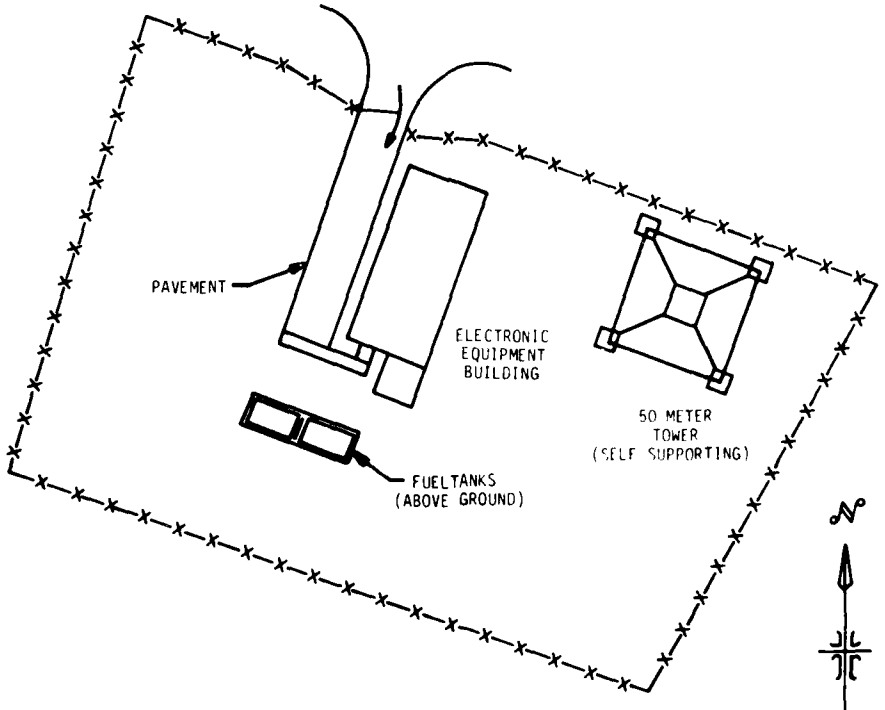
Antenna azimuths - (True)
Ceggia to Aviano - 354 degrees 19 minutes
Ceggia to Mt. Venda - 242 degrees 43 minutes

Radio configurations - (Paragraph 1.2.1.1.1(j))
Ceggia to Aviano - Option 1 or 2 (0.5 watt)
Ceggia to Mt. Venda - Option 3 or 4 (5 watts)

Orderwire address - 61

(d) Frequencies. Set the transmitter VCO and bandpass filter, synthesizer thumbwheel switches, receiver preselector, and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Aviano	8398	101475	8292	8222
Mt. Venda	8235	99438	8318	8248



(NOT DRAWN TO SCALE)

SITE INFORMATION
COORDINATES
LATITUDE 45° 40' 18" N
LONGITUDE 12° 39' 19" E

ELEVATION -1 METER

ANTENNA INFORMATION
1. CEGGIA TO MT VENDA
   A. AZIMUTH/DISTANCE: 242° 42'/ 85.6 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/3.1 METERS
   C. HEIGHT ABOVE GROUND: 47.2 METERS (XMT/RCV)
      29 METERS (RCV ONLY)

2. CEGGIA TO AVIANO
   A. AZIMUTH/DISTANCE: 354° 21'/30.6 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/2.8 METERS
   C. HEIGHT ABOVE GROUND: 29 METERS (XMT/RCV)
      47.2 METERS (RCV ONLY)

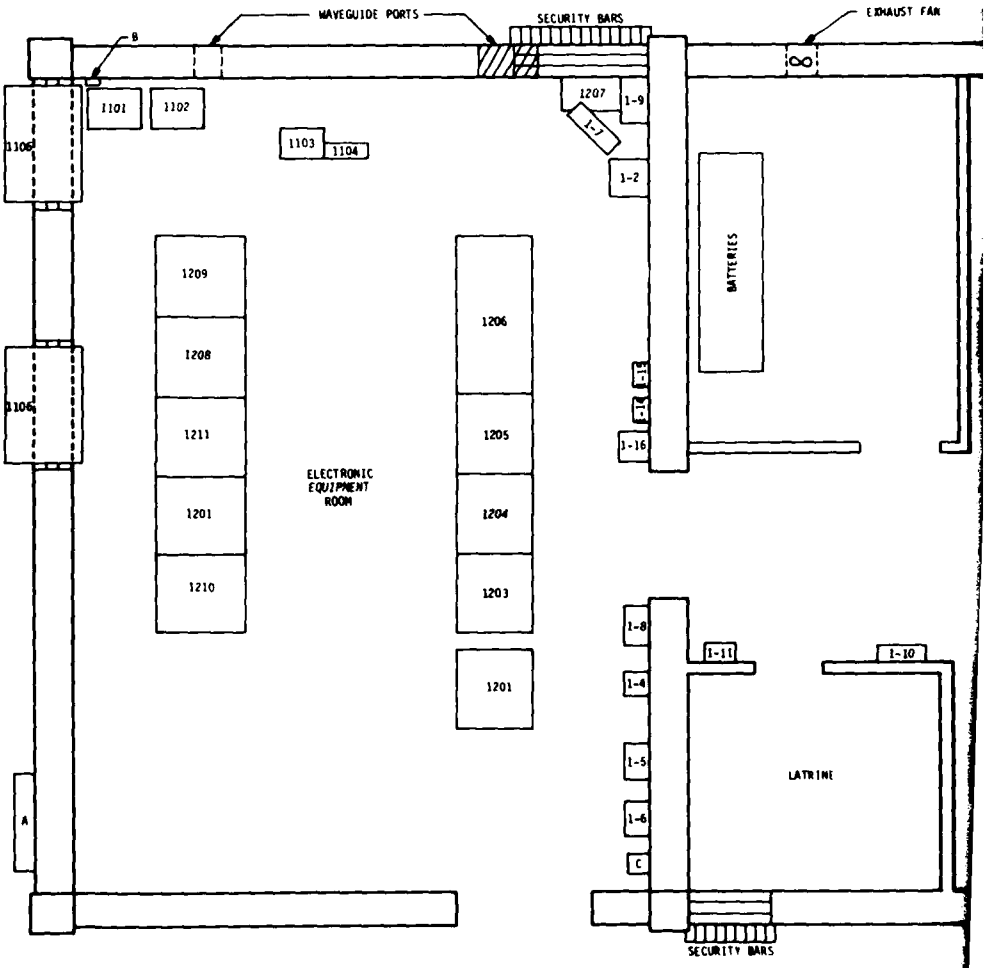
Figure 31. Ceggia Site Plan

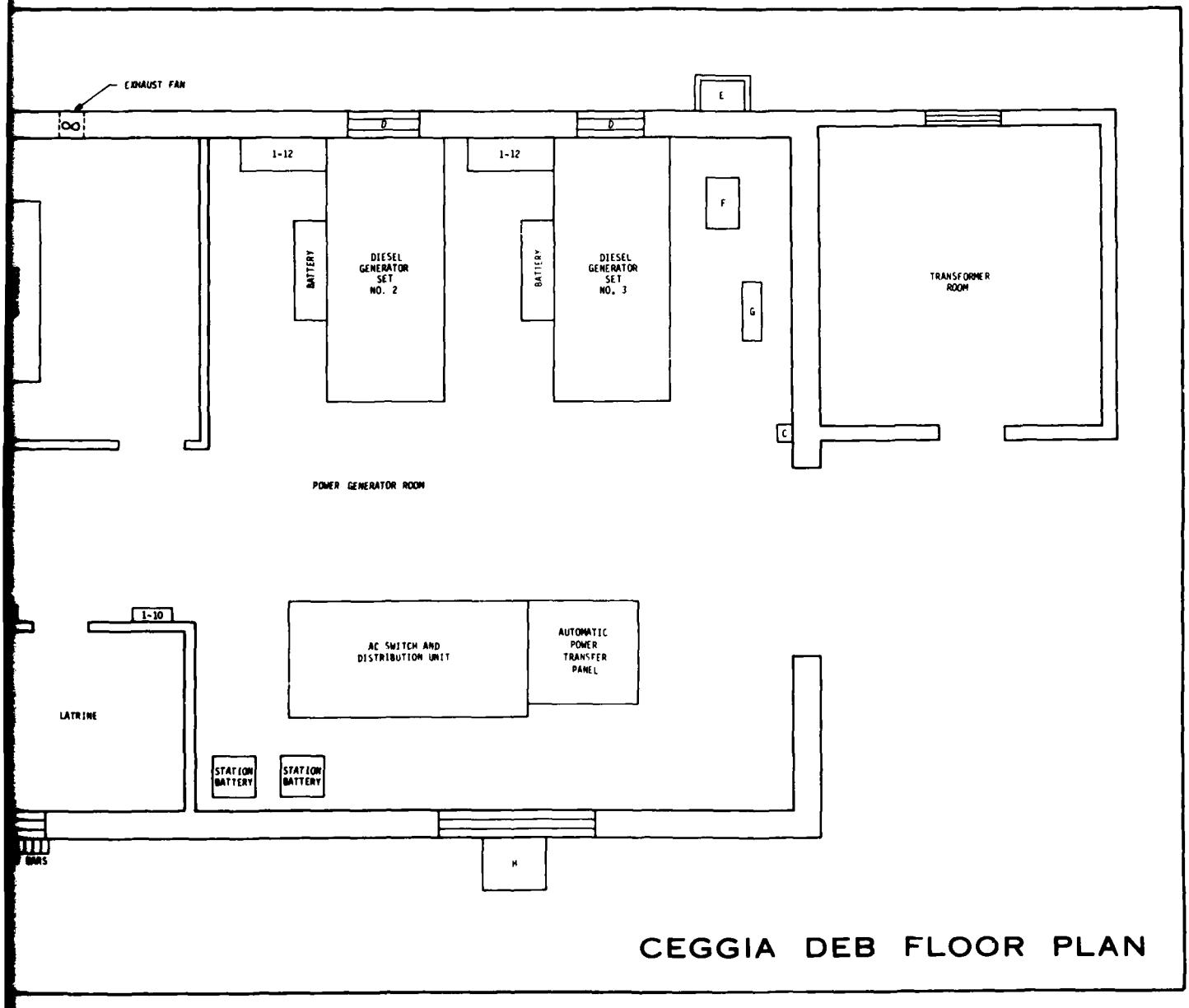
1-1 HEATER
1-2 DISTRIBUTION FRAME
1-3 TRANSFORMER 120V/600VAC
1-4 TECH PANEL 3D, 208V/120VAC, 50 HZ
1-5 CIRCUIT BREAKER TECH PANEL, 208VAC, 100 AMP
1-6 FIRE ALARM SYSTEM
1-7 OVERHEAD HEATER, 4KW
1-8 EMERGENCY LIGHTS
1-9 TA-182A SIGNAL CONVERTERS, 4 EACH
1-10 EMERGENCY LIGHTS
1-11 FIRE ALARM BELL
1-12 100 LITER FUEL TANK
1-14 CIRCUIT BREAKER, 3 POLE, 208VAC, 30 AMP
1-15 CIRCUIT BREAKER, 3 POLE, 208VAC, 30 AMP
1-16 NON-TECHNICAL POWER PANEL 208/120VAC

1101 FM12/800
1102 FM12/800
1103 HIGH FREQUENCY DISTRIBUTION FRAME
1104 AN/FCC-32
1106 AIR CONDITIONER 11,000 BTU

1201 RECTIFIER
1202 RADIO MISCELLANEOUS BAY
1203 AN/FCC-97
1204 AN/FCC-97
1205 AN/FRC-162(V)
1206 AN/FRC-166(V)
1207 COMPRESSOR/DEHYDRATOR
1208 TSEC/CY-104A
1209 TSEC/CY-104A
1210 T1 PATCH & TEST BAY
1211 INTERMEDIATE DISTRIBUTION FRAME

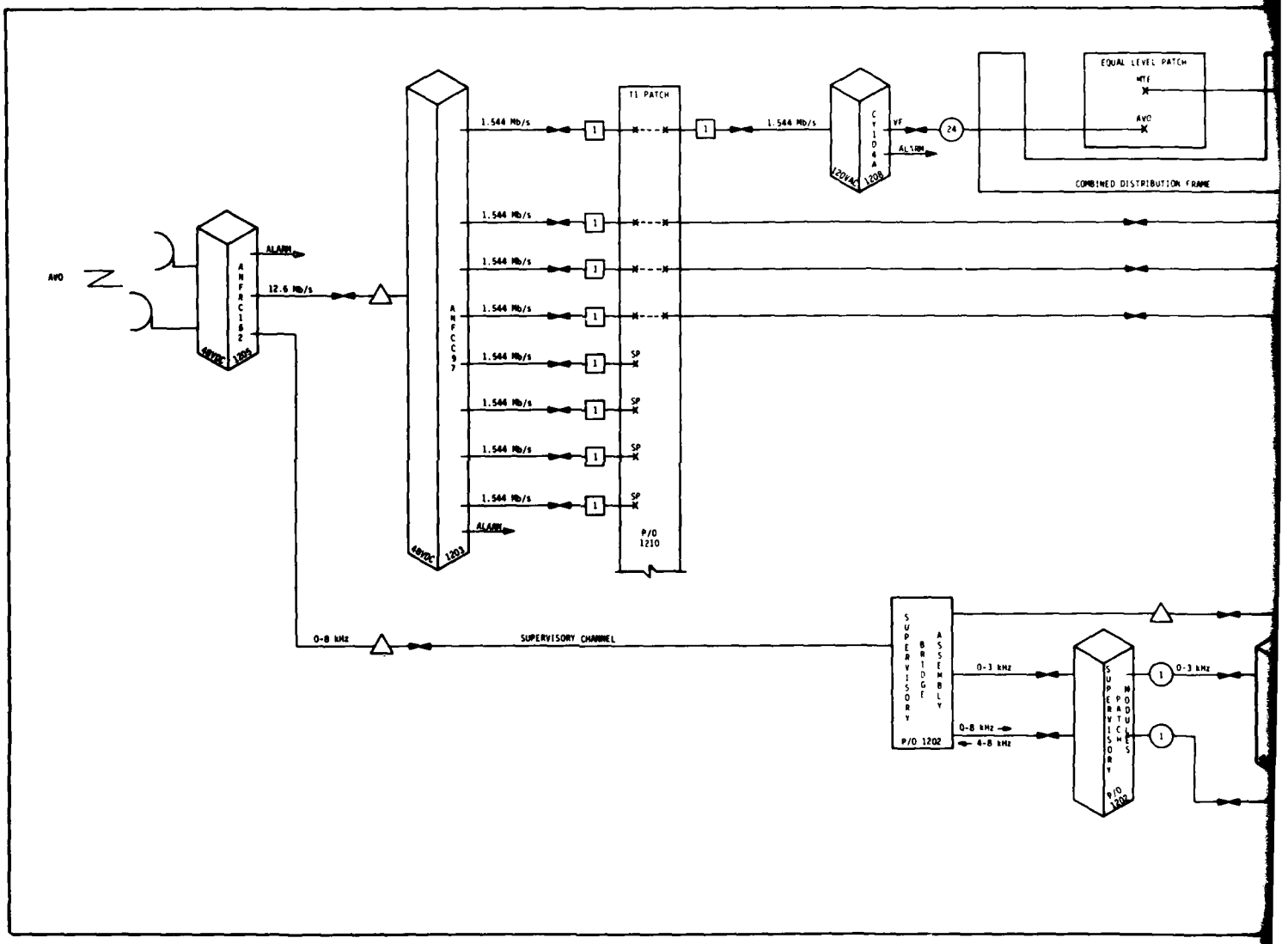
A TACTICAL INTERFACE
B STATION GROUND
C FIRE ALARM SWITCH
D EXHAUST VENTS
E CENTRIFUGE OVERFLOW TRAP
F CENTRIFUGE
G PUMP
H LOAD BANK





CEGGIA DEB FLOOR PLAN

Figure 32.



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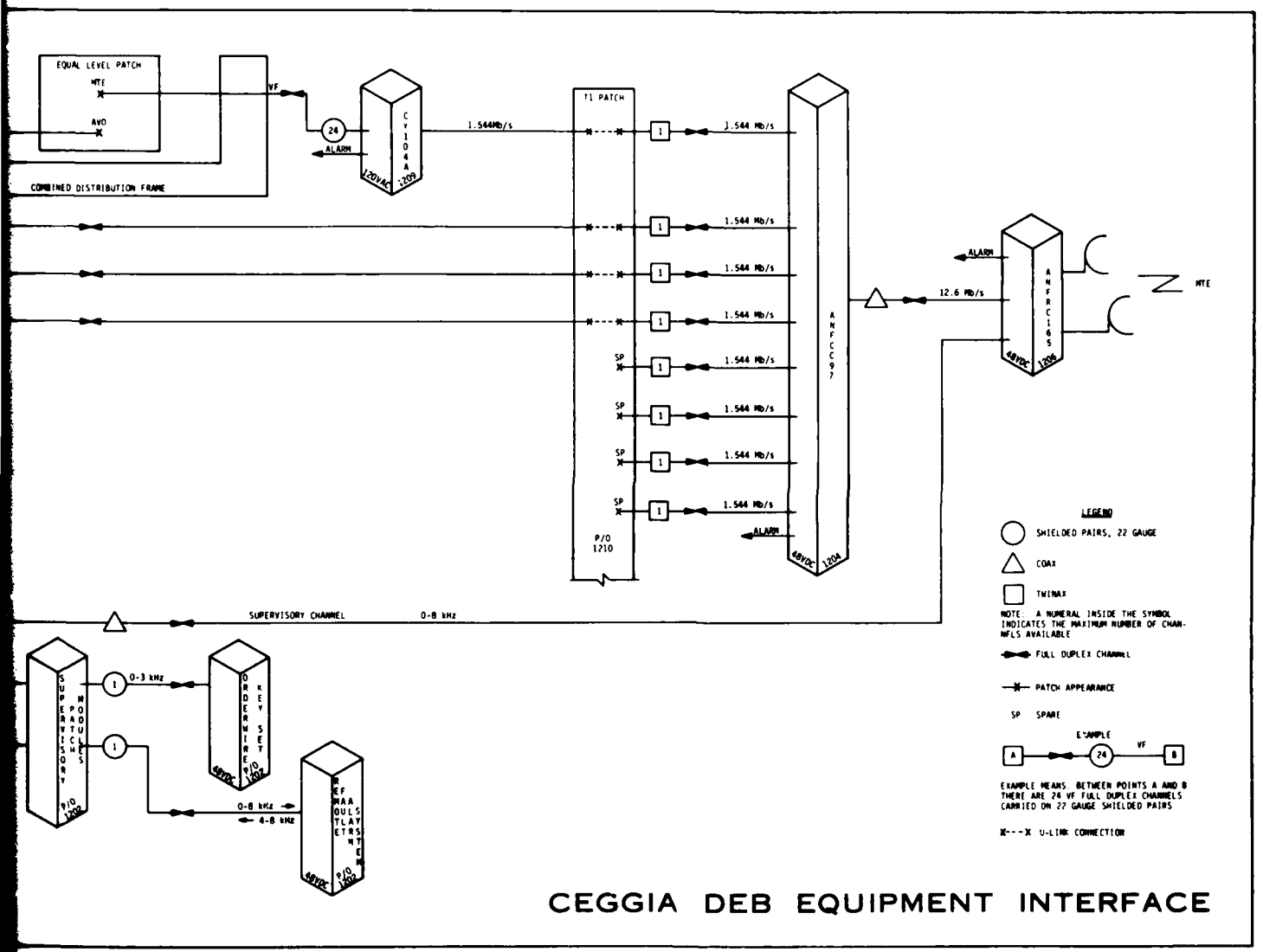


CEGGIA DEB EQUIPMENT INTERFACE

Figure 33.

2.1.2.2 Mt. Serra

(a) Site Data. The Mt. Serra site plan, building floor plan and existing site equipment interface drawings are shown as Figures 34, 35, and 36, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Outside USAF fence adjacent to tower (southwest side).

Radio configuration - (Paragraph 1.2.1.1.1(j))
Mt. Serra to Coltano - Option 1 (0.5 watt)
Mt. Serra to Mt. Cimone - Option 3 (5 watts)

Orderwire address - 59

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS location - Primary location: northern corner of site perimeter
Secondary location: in RAI courtyard, northwest of U.S. site

Shelter location - Any convenient location near MAS.

Minimum MAS height - 23.5 meters (77 feet)/13 sections

Maximum guy radius - 17.1 meters (56 feet)

Antenna polarization - Horizontal (Both links)

Antenna azimuths - (True)
Mt. Serra to Coltano - 229 degrees 49 minutes
Mt. Serra to Mt. Cimone - 13 degrees 17 minutes

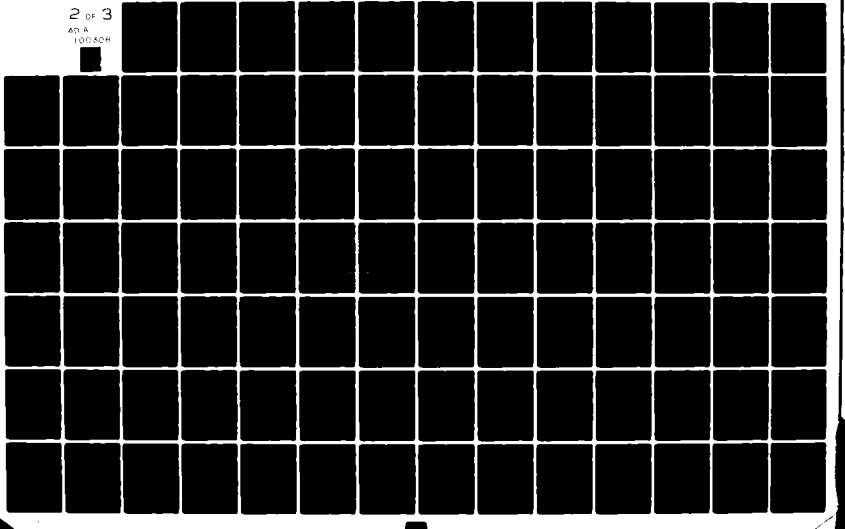
Radio configurations - (Paragraph 1.2.1.1.1(j))
Mt. Serra to Coltano - Option 1 or 2 (0.5 watt)
Mt. Serra to Mt. Cimone - Option 3 or 4 (5 watts)

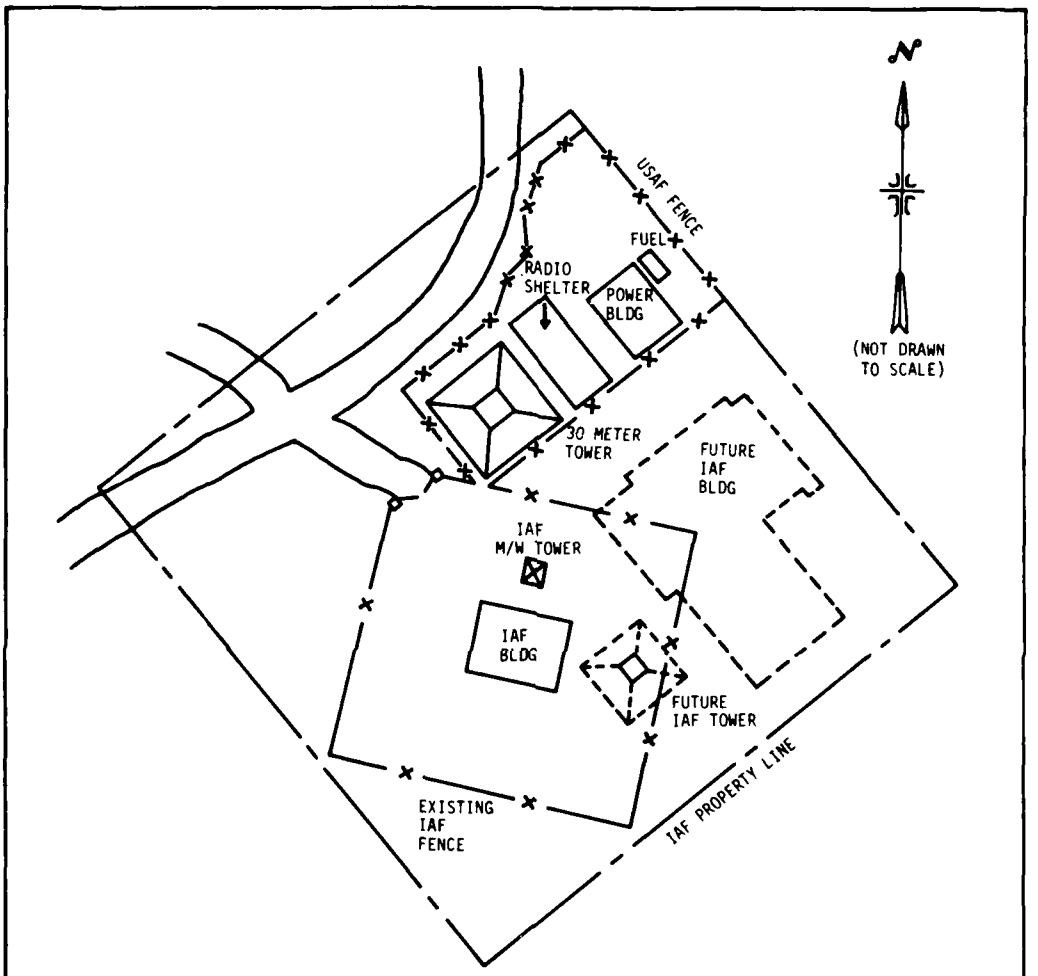
Orderwire address - 59

(d) Frequencies. Set the transmitter VCO and bandpass filter, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Coltano	8107.5	97844	8297.5	8227.5
Mt. Cimone	8392.5	101406	8202.5	8132.5

AD-A100 308 MITRE CORP BEDFORD MA F/G 17/2
DEB TYPE I RECONSTITUTION PACKAGE DEPLOYMENT MANUAL (RPDM).(U)
MAY 81 O H BRENDEN F19628-81-C-0001
UNCLASSIFIED MTR-8186 ESD-TR-81-123 NL





SITE INFORMATION
COORDINATES
LATITUDE 43° 44' 59" N
LONGITUDE 10° 33' 52" E

ELEVATION 913 METERS

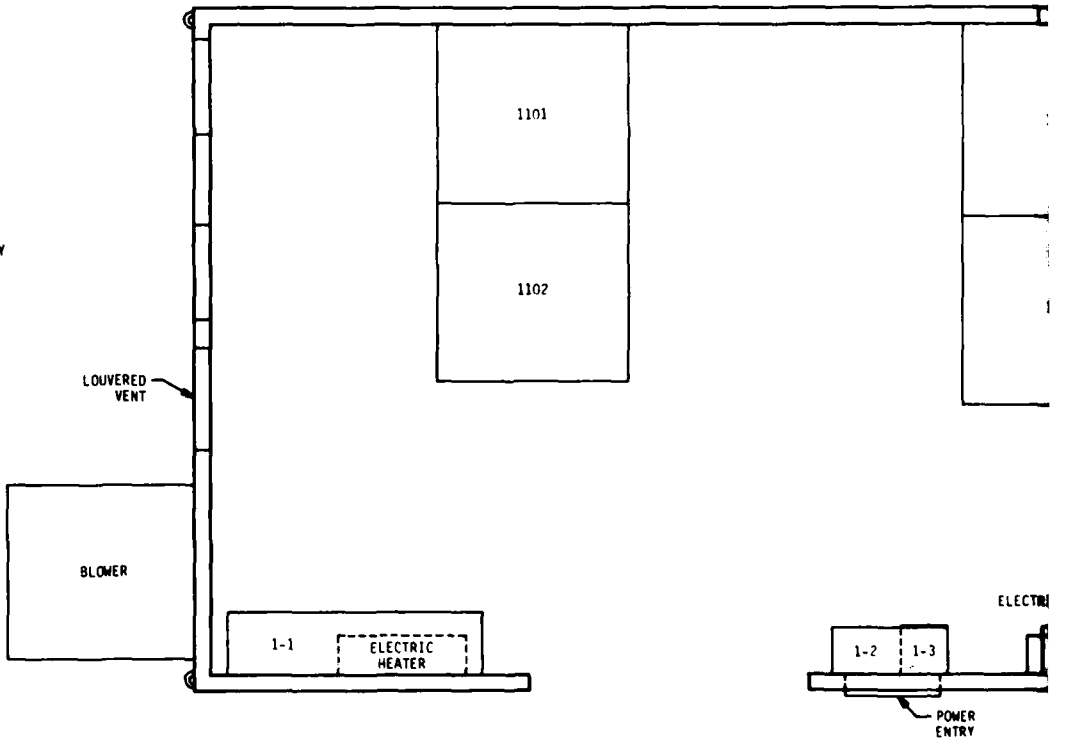
ANTENNA INFORMATION
1. MT SERRA TO MT CIMONE
   A. AZIMUTH/DISTANCE: 13° 17' 12"/50.8 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/3.2 METERS
   C. HEIGHT ABOVE GROUND: 30 METERS (XMT/RCV)
      23 METERS (RCV ONLY)

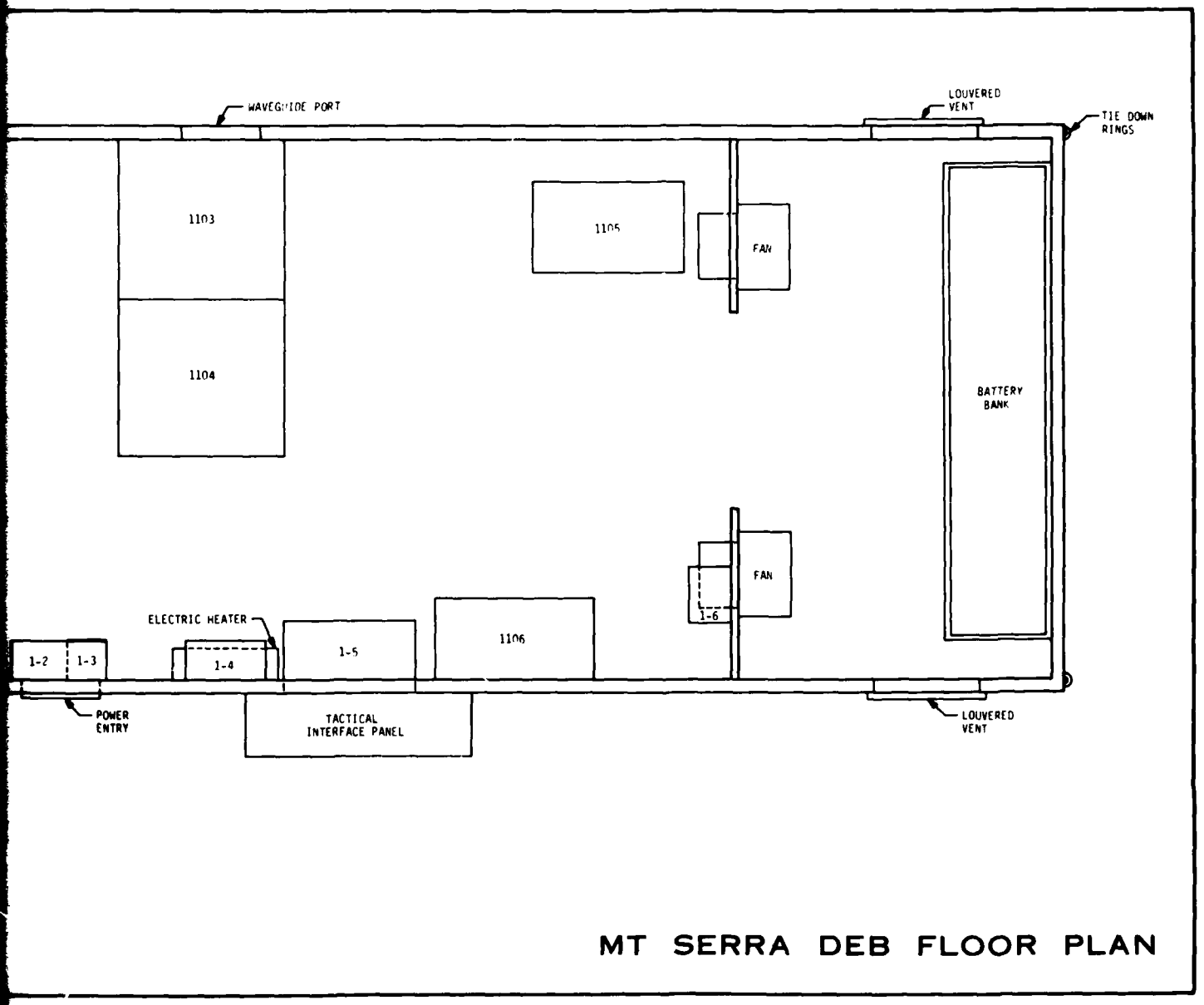
2. MT SERRA TO COLTANO
   A. AZIMUTH/DISTANCE: 231° 31' 35"/16.4 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/1.9 METERS
   C. HEIGHT ABOVE GROUND: 22.9 METERS (XMT/RCV)
      13.7 METERS (RCV ONLY)

Figure 34. Mt. Serra Site Plan

1-1 INTERMEDIATE DISTRIBUTION FRAME
1-2 POWER PANEL
1-3 TRANSFORMER, 120VAC
1-4 ALARM PANEL
1-5 TACTICAL INTERFACE BOX
1-6 MAIN BATTERY SWITCH

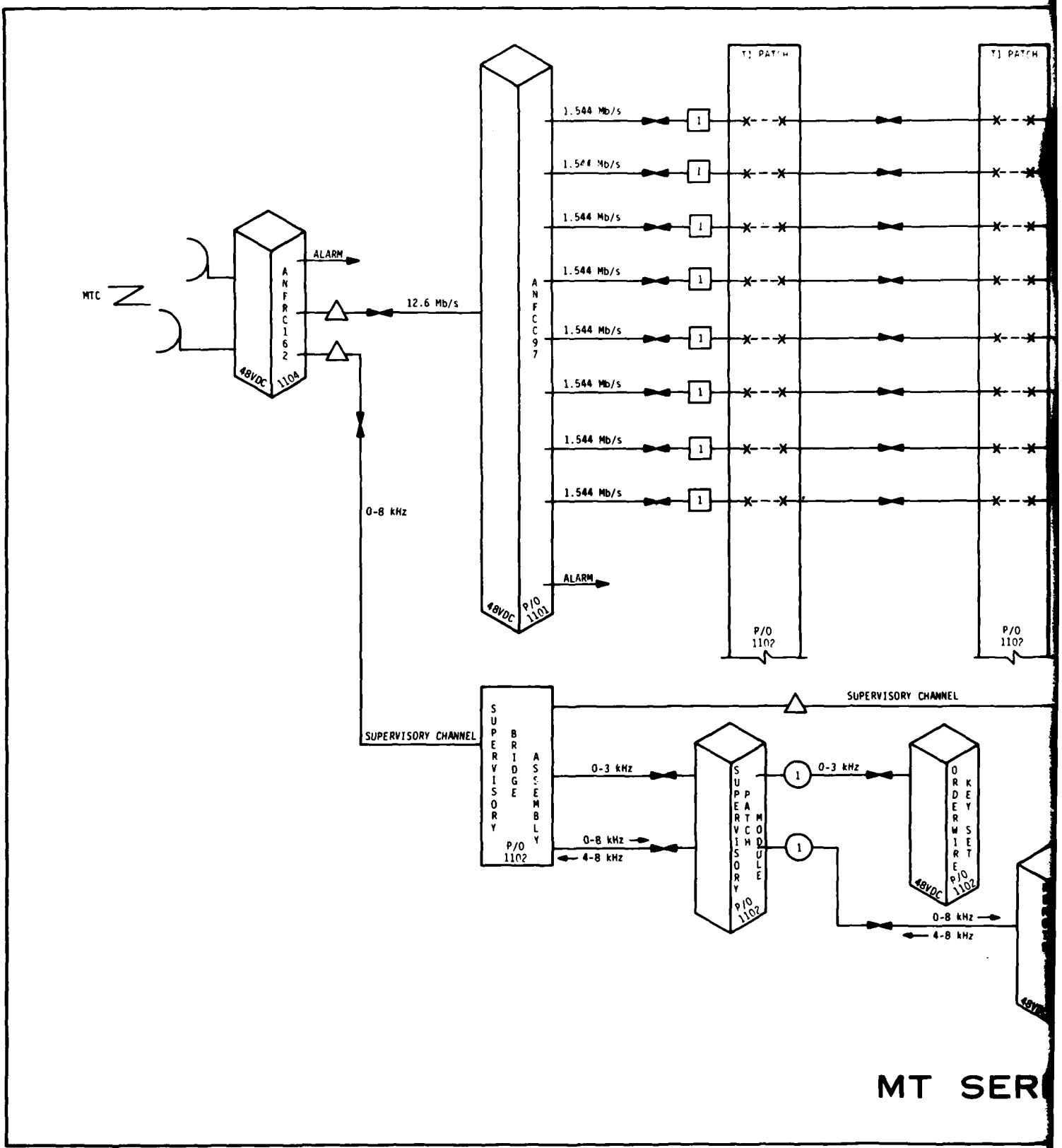
1101 SECOND LEVEL MULTIPLEXER (TDM)
1102 RADIO MISC BAY, T1 PATCH & TEST BAY
1103 AN/FRC-162(V) (COLTANO)
1104 AN/FRC-162(V) (MT CIMONE)
1105 COMPRESSOR/DEHYDRATOR
1106 RECTIFIER RACK



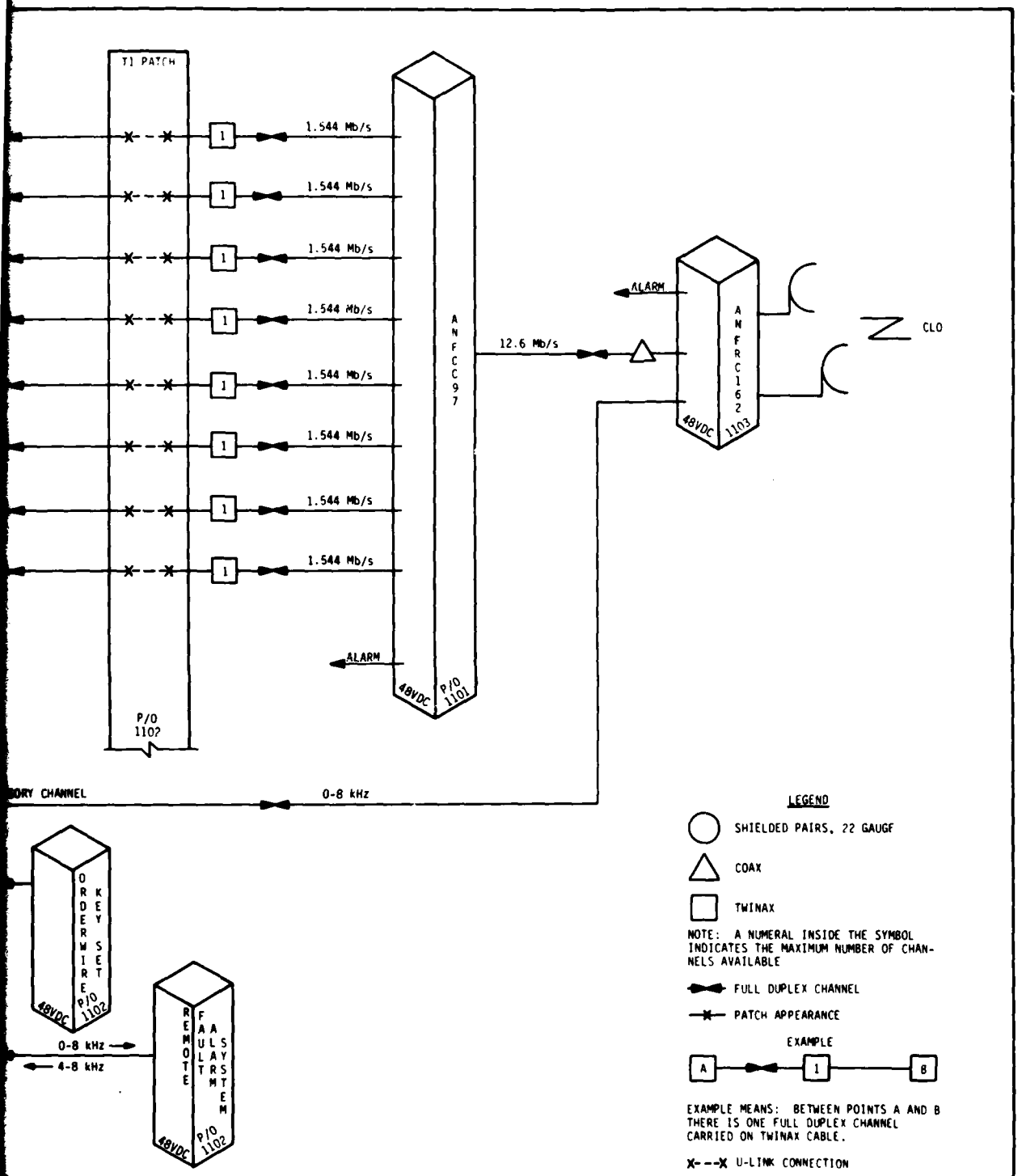


MT SERRA DEB FLOOR PLAN

Figure 35.


MTC
ALARM
ANFRC162
48VDC
1104
12.6 Mb/s
ANFCC97
1.544 Mb/s
1.544 Mb/s
1.544 Mb/s
1.544 Mb/s
1.544 Mb/s
1.544 Mb/s
1.544 Mb/s
1.544 Mb/s
T1 PATCH
P/O 1102
T1 PATCH
P/O 1102
0-8 kHz
ALARM
48VDC
P/O 1101
SUPERVISORY CHANNEL
SUPERVISORY CHANNEL
SUPERVISORY BRIDGE ASSEMBLY
P/O 1102
0-3 kHz
0-8 kHz
4-8 kHz
SUPERVISORY PATCH MODULE
P/O 1102
1
1
0-3 kHz
ORDERWIRE KEY SET
48VDC
P/O 1102
0-8 kHz
4-8 kHz

MT SER



MT SERRA DEB EQUIPMENT INTERFACE

Figure 36.

2.1.3 Three-Way Repeaters

Restoration of a three-way repeater will require the following:

(1) Type I Contingency Package - equipment shelter, primary power generator, and MAS (See the second scenario, below.), and

(2) 1/2 Type I A Contingency Package - one microwave radio, one two-watt solid state amplifier, tripod and adapters.

Restoration of a three-way repeater requires the use of FCC-97 second level multiplexer number 3, connected at baseband to a third microwave radio. The "third" radio will be one half of a Type I A Contingency Package. Two scenarios must be considered: (1) the site equipment building has been destroyed or disabled and the tower and antennas are intact, and (2) both the equipment building and site tower are disabled.

In the first scenario, the third radio is configured for remote operation with a two-watt solid state amplifier. The radio can be positioned on the workbench in the equipment shelter and remoted through the RF entry panel with remoting cables supplied with the shelter. (The remote boxes would be positioned at or near the base of the tower.) Shelter radios number 1 and 2 are configured as Option 3, with rectangular waveguide connections to the respective antennas. Basic configuration for a three-way repeater in Scenario 1 is shown in Figure 37.

If it is not possible to place the equipment shelter in close proximity to the tower, it may be advantageous to position the Type I A radio at the base of the existing tower with a two-watt solid state amplifier, interconnected through the shelter wall, at baseband, to FCC-97 number 3. Transmitter and receiver numbers 1 and 2 can then be configured as in Option 4, with transmitter and receiver RF modules remoted with two-watt solid state amplifiers, at the base of the existing tower. RF connections to the proper existing antennas and transmission lines are made at (or near) the tower base by either of the two methods described in Section 2.1.

In the second scenario (tower down), as in the first, the third radio is configured for remote operation with a two-watt solid state amplifier. The remote boxes and antenna are mounted on the I A tripod, which may be positioned on the shelter roof, or at some other convenient (elevated) position near the shelter. Shelter radios number 1 and 2 are configured as in Option 3, with rectangular waveguide connections to the respective MAS antennas.

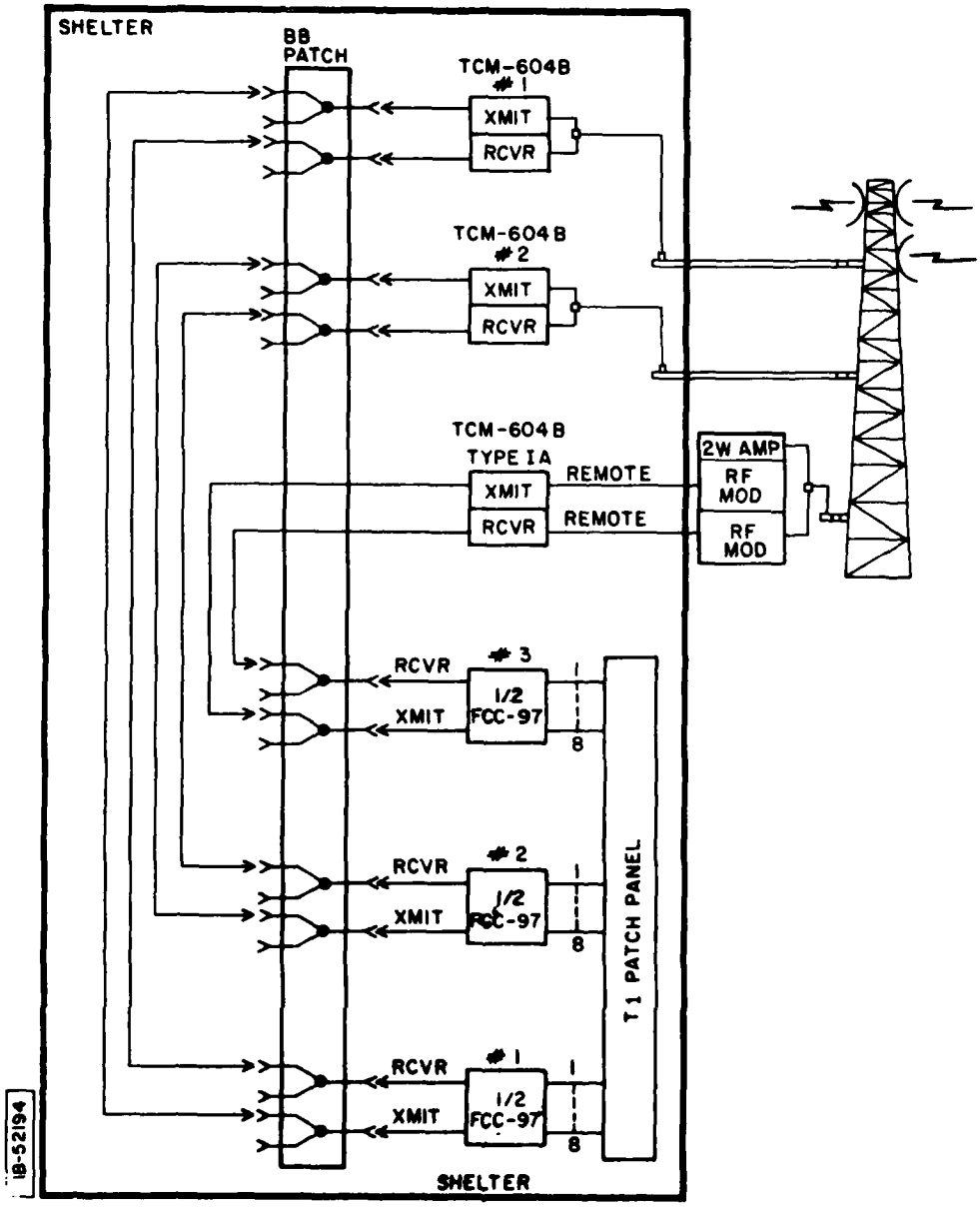


Figure 37. Three-way Repeater, Scenario 1

Baseband interconnection between the Type I A radio and second level MUX is by special patch cords, provided with the equipment shelter for that purpose. The shelter position is limited, due to available waveguide lengths, to within 50 feet of the MAS. Basic configuration for a three-way repeater in Scenario 2 is shown in Figure 38.

Listed below is major equipment, common to each DEB I three-way repeater site, needed for temporary restoration:

TCM-604B Radio	3 required
AN/FCC-97 TDM 2nd Level MUX	3 required
TSEC/CY-104A PCM 1st Level MUX	3 required

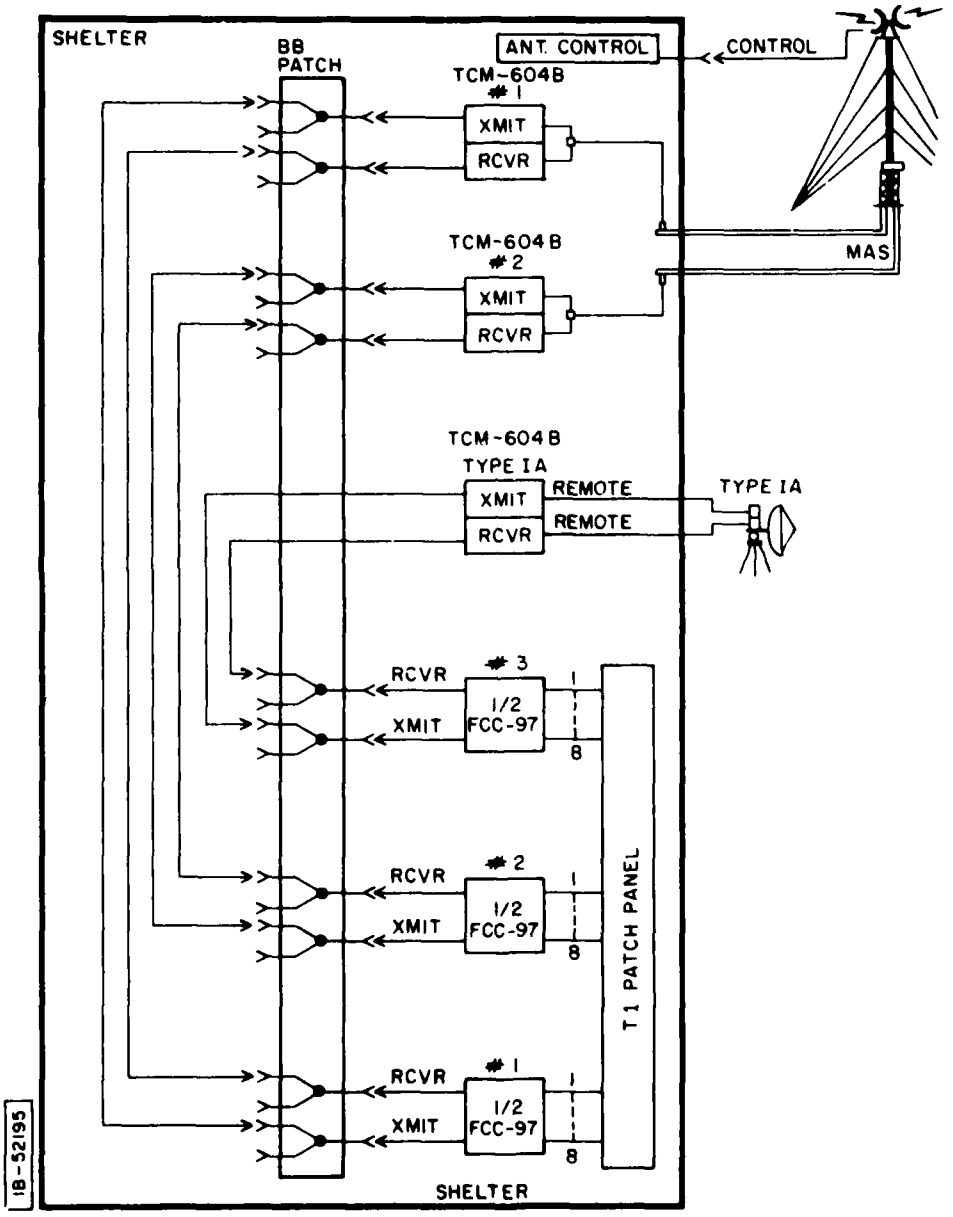


Figure 38. Three-way Repeater, Scenario 2

2.1.3.1 Mt. Corna

The following are typical equipment shelter and Type 1 A baseband patch connections for Mt. Corna:

FROM	CONNECTION	TO
Radio #1 (MTC)		2nd Level MUX #1
XMIT	U-Link	XMIT
RCV	U-Link	RCV
Radio #2 (MTE)		2nd Level MUX #3
XMIT	Patch Cord	XMIT
RCV	Patch Cord	RCV
Radio #3 (I A) (PAG)		2nd Level MUX #2
XMIT	Special	XMIT
RCV	Special	RCV

The following are Equipment Shelter T1 patch connections for Mt. Corna:

FROM	CONNECTION	TO
2nd Level MUX #1 (MTC)		2nd Level MUX #2 (PAG)
XMIT #1	U-Link	RCV #1
RCV #1	U-Link	XMIT #1
XMIT #2	U-Link	RCV #2
RCV #2	U-link	XMIT #2
XMIT #3	U-Link	RCV #3
RCV #3	U-Link	XMIT #3
XMIT #4	U-Link	RCV #4
RCV #4	U-Link	XMIT #4
XMIT #5	U-Link	RCV #5
RCV #5	U-Link	XMIT #5
2nd Level MUX #1 (MTC)		1st Level MUX #1
XMIT #6	Patch Cord	XMIT
RCV #6	Patch Cord	RCV

FROM	CONNECTION	TO
2nd Level MUX #1 (MTC)		2nd Level MUX #3 (MTE)
XMIT #7	Patch Cord	RCV #3
RCV #7	Patch Cord	XMIT #3
XMIT #8	Patch Cord	RCV #4
RCV #8	Patch Cord	XMIT #4
2nd Level MUX #2 (PAG)		1st Level MUX #2
XMIT #6	Patch Cord	XMIT
RCV #6	Patch Cord	RCV
2nd Level MUX #2 (PAG)		2nd Level MUX #3 (MTE)
XMIT #7	Patch Cord	RCV #2
RCV #7	Patch Cord	XMIT #2
XMIT #8	Patch Cord	RCV #1
RCV #8	Patch Cord	XMIT #1
2nd Level MUX #3 (MTE)		1st Level MUX #3
XMIT #5	Patch Cord	XMIT
RCV #5	Patch Cord	RCV

VF patch requirements for Mt. Corna will be subject to most up-to-date information and should be included in the detailed reconstitution plan.

(a) Site Data. The Mt. Corna site plan, building floor plan and existing site equipment interface drawings are shown as Figures 39, 40, and 41, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Adjacent to (west of) DEB tower.

Radio configurations - (Paragraph 1.2.1.1.1(j))
#1 Mt. Corna to Mt. Cimone - Option 3 (5 watts)
#2 Mt. Corna to Mt. Venda - Option 3 (5 watts)
#3 Mt. Corna to Paganella - Option 4 (2 watts)

Orderwire address - 75

(c) Mast Antenna Subsystem. If erection of the MAS is required, the following apply:

MAS and shelter locations - Area between transformer and metal storage buildings.

Minimum MAS height - 30.5 meters (100 feet)/17 sections

Maximum guy radius - 26.5 meters (87 feet)

Antenna polarizations - Horizontal (All three links)

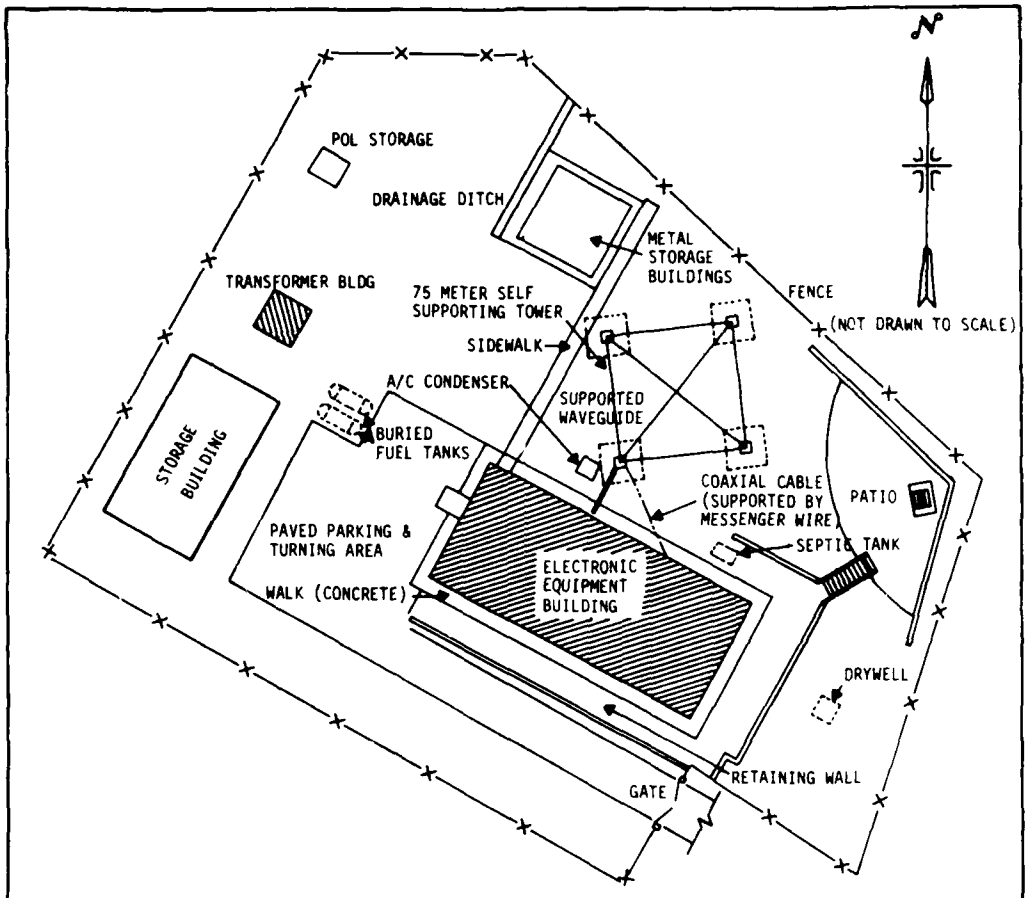
Antenna azimuths - (True)
Mt. Corna to Mt. Cimone - 174 degrees 8 minutes
Mt. Corna to Mt. Paganella - 24 degrees 55 minutes
Mt. Corna to Mt. Venda - 94 degrees 16 minutes

Radio configurations - (Paragraph 1.2.1.1.1(j))
#1 Mt. Corna to Mt. Cimone - Option 3 (5 watts)
#2 Mt. Corna to Mt. Venda - Option 3 (5 watts)
#3 Mt. Corna to Mt. Paganella - Option 4 (2 watts)

Orderwire address - 75

(d) Frequencies. Set the transmitter VCO and bandpass filter, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Mt. Cimone (Radio #1)	8107.5	97844	8297.5	8227.5
Paganella (Radio #3) (Type I A)	8202.5	99031	8392.5	8322.5
Mt. Venda (Radio #2)	8235	99438	8318	8248



SITE INFORMATION
COORDINATES
LATITUDE 45° 22' 50" N
LONGITUDE 10° 31' 59" E

ELEVATION 195 METERS

ANTENNA INFORMATION

1. MT CORNA TO PAGANELLA
   A. AZIMUTH/DISTANCE: 24° 54' 37"/93.2 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
   C. HEIGHT ABOVE GROUND: 11.0 METERS (XMT/RCV)
      41.47 METERS (RCV ONLY)

2. MT CORNA TO MT VENDA
   A. AZIMUTH/DISTANCE: 94° 15' 49"/90.6 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
   C. HEIGHT ABOVE GROUND: 26.5 METERS (XMT/RCV)
      42.7 METERS (RCV ONLY)

3. MT CORNA TO MT CIMONE
   A. AZIMUTH/DISTANCE: 174° 10' 10"/132.5 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/3.2 METERS
   C. HEIGHT ABOVE GROUND: 12.2 METERS (XMT/RCV)
      42.7 METERS (RCV ONLY)

Figure 39. Mt. Corna Site Plan

1-1 TECH AC POWER PANEL, 220-110VAC
1-2 UTILITY AC POWER PANEL, 380-220VAC
1-3 IDF, 5 W/10 BLOCKS, 1 W/9 BLOCK
1-4 UTILITY POWER PANEL
1-5 CIRCUIT BREAKERS FOR FM12 800
1-7 WAVEGUIDE ENTRY PORT
1-9 120VAC PANEL

2-1 TRANSFORMER BY-PASS SYSTEM
2-2 EMERGENCY LIGHT
2-3 TECH LOAD PANEL
2-4 UTILITY POWER DISTRIBUTION PANEL
2-6 CIRCUIT BREAKERS FOR AN/GRT-22/AN-GRR-24

3-1 DEB PRIMARY AC CIRCUIT BREAKERS
3-2 DEB UTILITY AC TRANSFORMER, 120VAC
3-3 ALARM TERMINAL PANEL

1103 EM120/400, TRANSMITTER (MT VENDA)
1104 EM120/400, RECEIVER (MT VENDA)
1105 EM120/400, TRANSMITTER (MT CIMONE)
1106 EM120/400, RECEIVER (MT CIMONE)
1107 EM120/400, TRANSMITTER (PAGANELLA)
1108 EM120/400, RECEIVER (PAGANELLA)

1203 V60FU SIEMENS MUX (MT VENDA)
1204 V60FU SIEMENS MUX, SUPERGROUP 2 (MT CIMONE)
1205 V60FU SIEMENS MUX, SUPERGROUP 1 (MT CIMONE)
1206 V60FU SIEMENS MUX, SUPERGROUP 2 (PAGANELLA)
1207 V60FU SIEMENS MUX, SUPERGROUP 1 (PAGANELLA)
1208 GROUP PILOT BAY, REL13C73A

1303 VZ-12 SIEMENS MUX (FELDBERG)
1304 (MT VENDA)
1305 (MT VERGINE)
1306 (COLTANO)
1307 (CIMA GALLINA)
1308 (STUTTGART)
1309 VZ-12 SIEMENS MUX (MT VENDA)

1407 THROUGH-FILTER BAY, REL13C44
1408 GROUP DISTRIBUTION PATCH BAY, REL13P70C

1503 VF ATTENUATORS, TELESIG 2273X
1504 AM/FCC-32, HIGH FREQUENCY DISTRIBUTING FRAME
1505 AM/FCC-32, 12 CHANNEL COMBINATION
1508 TEST ALARM, TELESIG 2266A
1509 AUDIO TEST, TELESIG 2269A
OPR KEY TELESET TYPE
1510 EQUIPMENT PATCH, TELESIG 2263H
1511 CIRCUIT PATCH, TELESIG 2263J

1602 SIEMENS-MAJOR, FM12 800
1603 SIEMENS-MAJOR, FM12 800

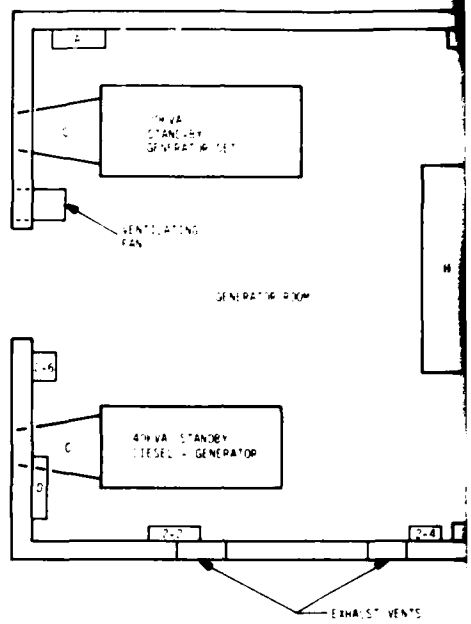
1701 AN/FRC-165 (MT CIMONE)
1702 AN/FRC-165 (MT VENDA)
1703 AN/FRC-165 (PAGANELLA)
1704 RADIO MISCELLANEOUS BAY
1705 DEB INTERMEDIATE DISTRIBUTION FRAME
1706 RECTIFIER BAY
1707 TSEC/CY-104A (PCM)
1708 TSEC/CY-104A (PCM)
1709 TSEC/CY-104A (PCM)
1710 T1 PATCH & TEST BAY
1711 AN/FCC-97 (PAGANELLA)
1712 AN/FCC-97 (MT VENDA)
1713 AN/FCC-97 (MT CIMONE)
1714 PRESSURE DEHYDRATOR

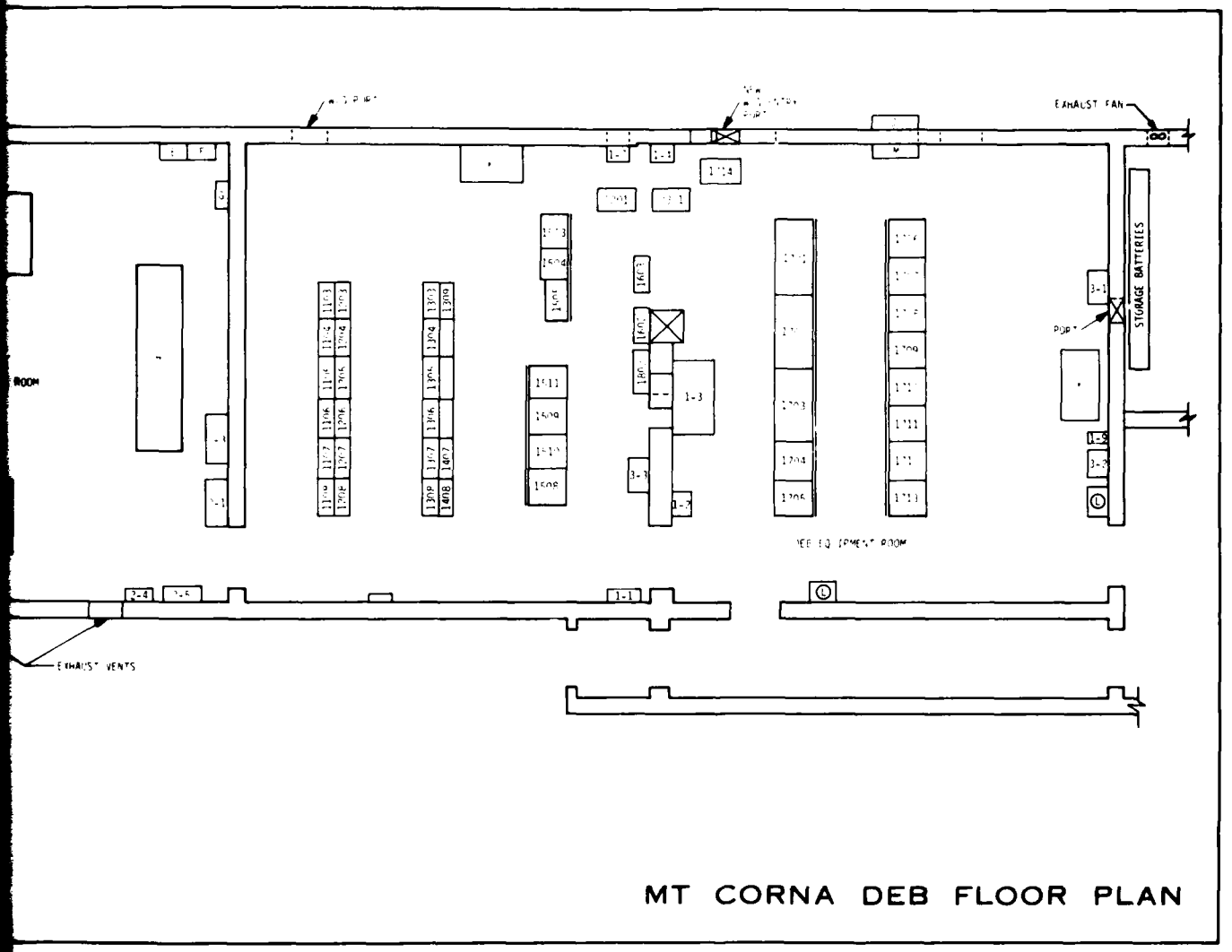
1802 GATES TRANSCEIVER, SENSOR RADIO

2201 AN/GRT-22, 2 EACH TRANSMITTERS
AN/GRR-24, 2 EACH RECEIVERS

2301 TWO WAY BASEBAND BRIDGING NETWORK (B)
BRIDGE ASSEMBLY SHELF
ORDERWIRE JACK MODULE
ORDERWIRE MULTIPLEX SET TYPE III

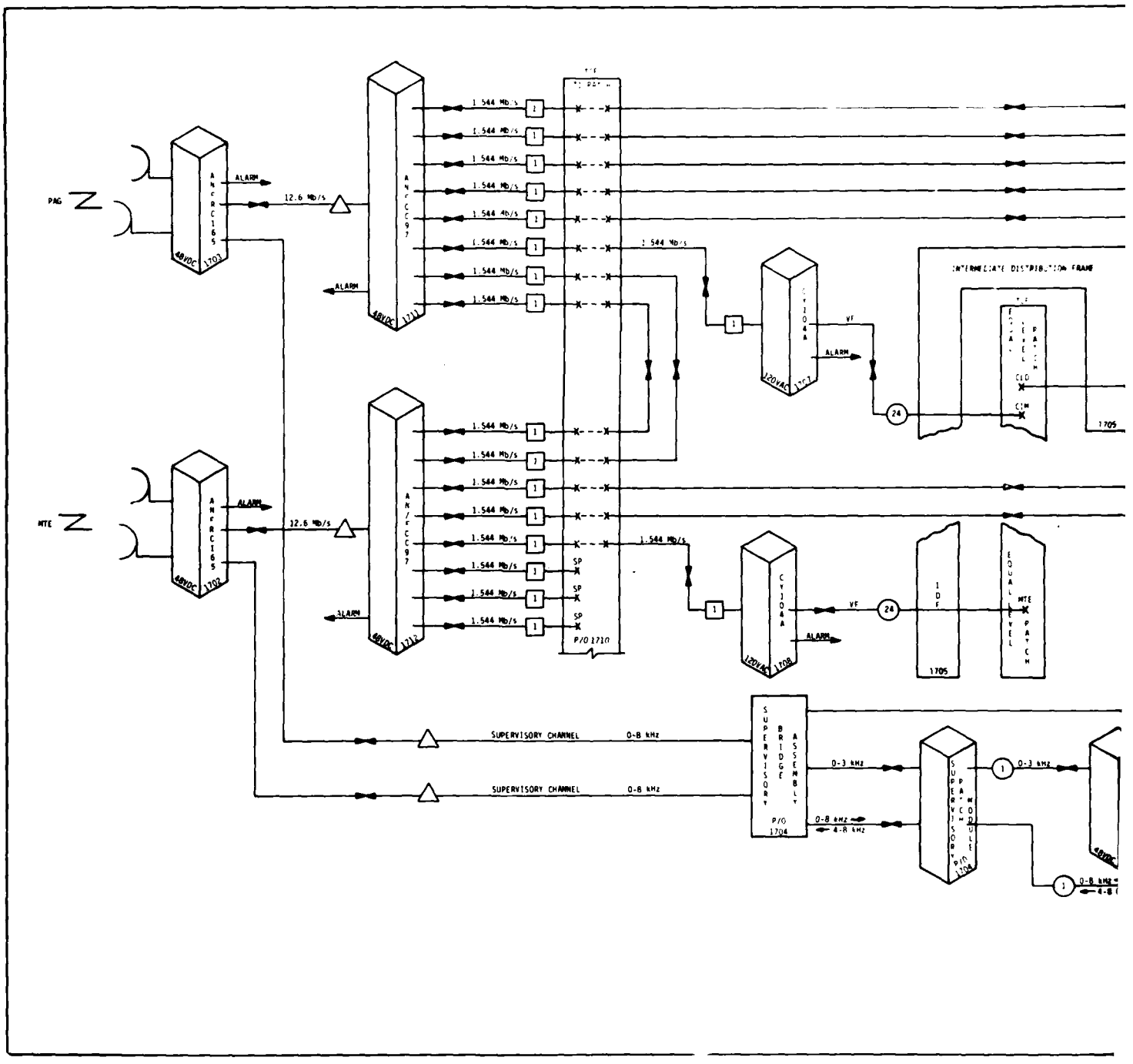
A STARTING BATTERIES, 12V, 4 EACH
B VENTILATING FAN
C DIESEL AIR EXHAUST DUCT
D AUTOMATIC FUEL PUMPS, 2 EACH
E POWER DISTRIBUTION PANEL FOR HEATERS
F UTILITY POWER DISTRIBUTION PANEL
G CONTROL PANEL AND THERMOSTAT FOR VENTILATING FAN
H EMERGENCY POWER SWITCH GEAR AND DISTRIBUTION PANEL
J TACTICAL INTERFACE PANEL
K AIR CONDITIONING UNITS
L EMERGENCY LIGHTS
M TACTICAL INTERFACE BOX





MT CORNA DEB FLOOR PLAN

Figure 40.



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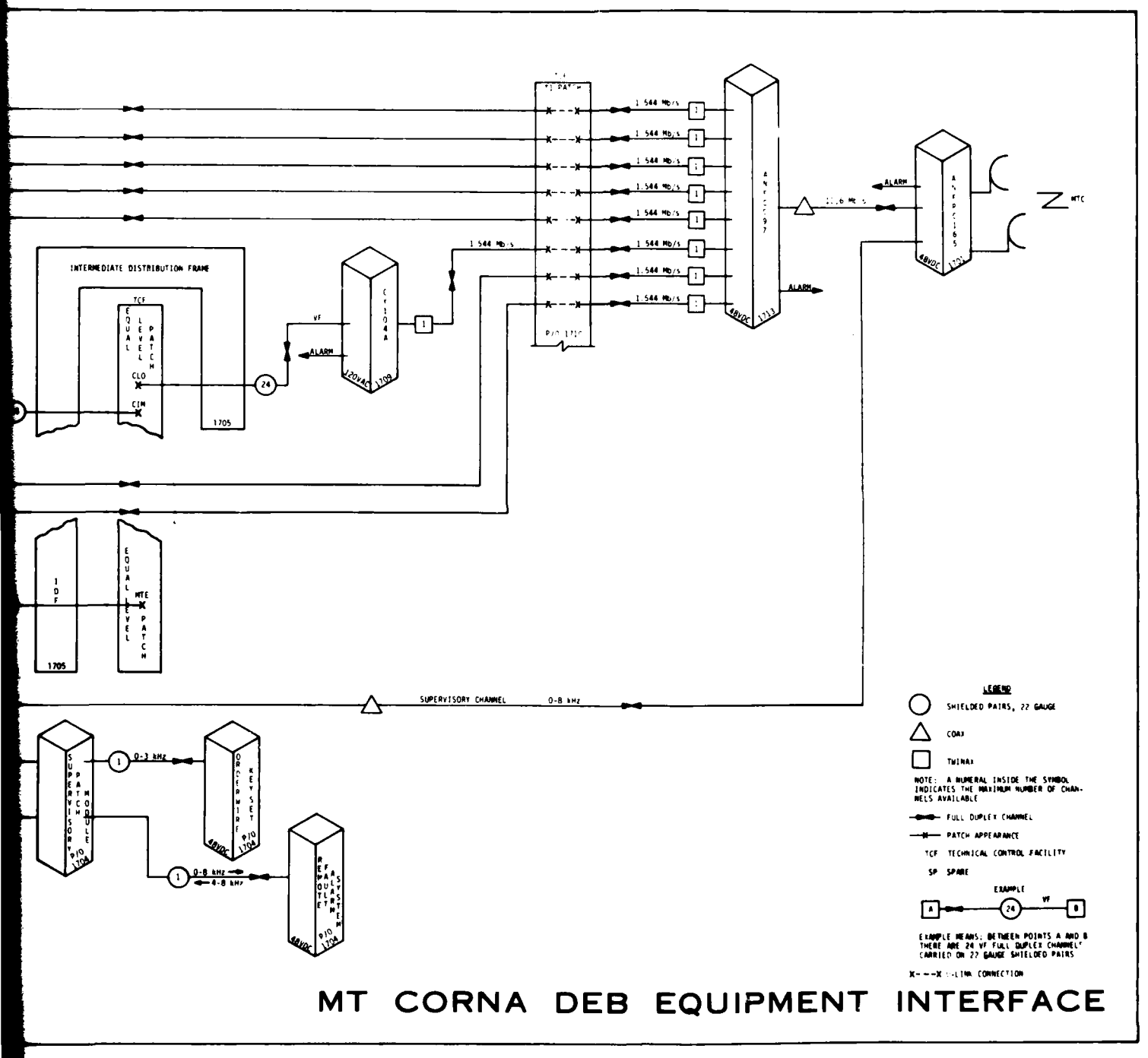


MT CORNA DEB EQUIPMENT INTERFACE

Figure 41.

2.1.3.2 Mt. Venda

The site building and tower at Mt. Venda are located on the steep north slope of the mountain. The only level area in the vicinity is occupied by an Italian RAI television site. There is insufficient terrain to facilitate erection of the MAS and, at the same time provide unobstructed LOS paths for the links served by Mt. Venda. For this reason, if the site antenna subsystem should be disabled, reconstitution will require utilization of tripod mounted Type I A antennas. One possible location for tripod mounted antennas would be atop the Italian Air Force communications building. The communications building is of concrete construction and is located adjacent to the RAI site. It is possible to position the Type I shelter in the small parking lot next to the Italian Air Force communications building. The shelter radios would be remoted with two-watt solid state amplifiers and the third radio (Type I A) would be tripod-mounted, interconnected with the shelter at baseband. Permission to use the area and building for emergency restoration of the DEB site must be negotiated in advance with the Italian Air Force. Instructions for access should be included in the detailed reconstitution plan.

The following are typical equipment shelter and Type I A baseband patch connections for Mt. Venda:

FROM	CONNECTIONS	TO
Radio #1 (MCA)		2nd Level MUX #1
XMIT	U-Link	XMIT
RCV	U-Link	RCV
Radio #2 (CEG)		2nd Level MUX #2
XMIT	U-Link	XMIT
RCV	U-Link	RCV
Radio #3 (I A) (VCA)		2nd Level MUX #3
XMIT	Special	XMIT
RCV	Special	RCV

The following are equipment shelter T1 patch connections for Mt. Venda:

FROM	CONNECTIONS	TO
2nd Level MUX #1 (MCA)		2nd Level MUX #2 (CEG)
XMIT #2	U-Link	RCV #2
RCV #2	U-Link	XMIT #2
XMIT #3	U-Link	RCV #3
RCV #3	U-Link	XMIT #3
2nd Level MUX #1 (MCA)		2nd Level MUX #3 (VCA)
XMIT #1	Patch Cord	RCV #3
RCV #1	Patch Cord	XMIT #3
XMIT #4	Patch Cord	RCV #1
RCV #4	Patch Cord	XMIT #1
2nd Level MUX #1 (MCA)		1st Level MUX #1
XMIT #5	Patch Cord	XMIT
RCV #5	Patch Cord	RCV
2nd Level MUX #2 (CEG)		1st Level MUX #2
XMIT #1	Patch Cord	XMIT
RCV #1	Patch Cord	RCV
2nd Level MUX #2 (CEG)		2nd Level MUX #3 (VCA)
XMIT #4	Patch Cord	RCV #2
RCV #4	Patch Cord	XMIT #2
2nd Level MUX #3 (VCA)		1st Level MUX #3
XMIT #4	Patch Cord	XMIT
RCV #4	Patch Cord	RCV

VF patch requirements at Mt. Venda will be subject to most up-to-date information and should be included in the detailed reconstitution plan.

(a) Site Data. The Mt. Venda site plan, building floor plan and existing site equipment interface drawings are shown as Figures 42, 43, and 44, respectively.

(b) Site Antenna Subsystem. If the site antenna subsystem is intact, the following recommendations apply:

Shelter location - Entrance driveway adjacent to retaining wall.

Radio configurations - (Paragraph 1.2.1.1.1(j))
#1 Mt. Venda to Mt. Corna - Option 3 (5 watts)
#2 Mt. Venda to Ceggia - Option 3 (5 watts)
#3 Mt. Venda to Vicenza - Option 2 (0.5 watt)

Orderwire address - 76

(c) Type I A Antennas. If the site antenna subsystem is disabled, the following recommendations apply:

Shelter location - Parking lot adjacent to the Italian Air Force Communications Building.

Antenna locations (I A Tripods) - On top of the Italian Air Force Communications Building.

Antenna polarization - Horizontal (Three links)

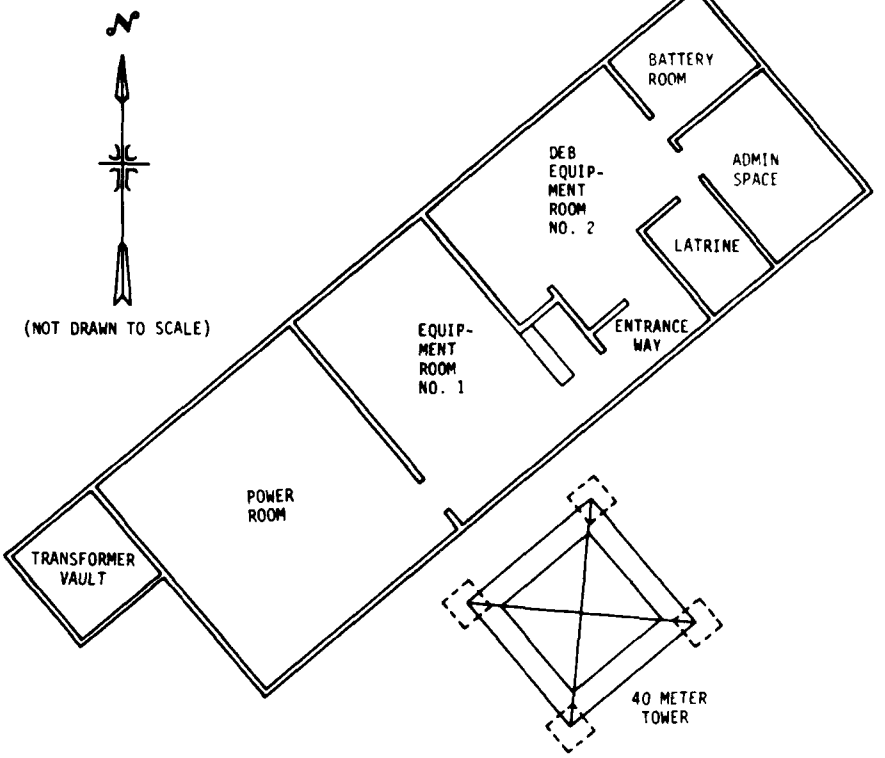
Antenna azimuths - (True)
Mt. Venda to Mt. Corna - 275 degrees 5 minutes
Mt. Venda to Ceggia - 62 degrees 1 minute
Mt. Venda to Vicenza - 341 degrees 4 minutes

Radio configurations - (Paragraph 1.2.1.1.1(j))
#1 Mt. Venda to Mt. Corna - Option 4 (2 watts)
#2 Mt. Venda to Ceggia - Option 4 (2 watts)
#3 Mt. Venda to Vicenza - Type I A (0.5 watt)

Orderwire address - 76

(d) Frequencies. Set the transmitter VCO and bandpass filter, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Mt. Corna (Radio #1)	8318	100475	8235	8165
Ceggia (Radio #2)	8318	100475	8235	8165
Vicenza (Radio #3)	8292	100150	8398	8328



SITE INFORMATION

COORDINATES

LATITUDE 45° 18' 51" N

LONGITUDE 11° 41' 05" E

ELEVATION 594.4 METERS

ANTENNA INFORMATION

1. MT VENDA TO MT CORNA
   - A. AZIMUTH/DISTANCE: 275° 05' 00"/90.1 KILOMETERS
   - B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
   - C. HEIGHT ABOVE GROUND: 16.8 METERS (XMT/RCV)
     7.6 METERS (RCV ONLY)

2. MT VENDA TO VICENZA
   - A. AZIMUTH/DISTANCE: 346° 49' 00"/27.4 KILOMETERS
   - B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
   - C. HEIGHT ABOVE GROUND: 23 METERS (XMT/RCV)
     13.7 METERS (RCV ONLY)

3. MT VENDA TO CEGGIA
   - A. AZIMUTH/DISTANCE: 62° 01' 10"/85.6 KILOMETERS
   - B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
   - C. HEIGHT ABOVE GROUND: 15.2 METERS (XMT/RCV)
     33.5 METERS (RCV ONLY)

Figure 42. Mt. Venda Site Plan

1-1 EMERGENCY POWER SWITCHING GEAR
1-2 STARTING BATTERY, 24VAC (2 EACH)
1-3 UTILITY PANEL, 220V/127V
1-4 TECH PANEL 2, 110VAC, 1 PHASE
1-5 CIRCUIT BREAKER PANEL
1-6 CIRCUIT BREAKER PANEL
1-8 AN/FCC-32, TECH POWER PANEL 3, 110 VAC, 1 PHASE
1-9 CIRCUIT BREAKER, ELEC HEATERS
1-10 30 AMP, 9KVA TRANSFORMER 380, 220/127VAC
1-11 TECH CORD CIRCUIT BREAKERS
1-12 COMM/SWITCH GEAR BY-PASS
1-13 3:1 20KVA TRANSFORMER 380, 220/110VAC
1-14 DEB PRIMARY AC CIRCUIT BREAKERS (2 EACH)
1-15 DEB UTILITY AC TRANSFORMER, 120VAC
1-16 DEB AIR CONDITIONER UNIT
1-17 ALARM TERMINAL PANEL
1-18 DEB AIR CONDITIONER THERMOSTAT
1-19 120VAC DISTRIBUTION BOX
1-20 HI-LOW ALARM THERMOSTATS
1-21 AIR CONDITIONER CONTROL PANEL

1101 TERMINAL BAY V212, GROUP 4
1102 TERMINAL BAY V212, GROUP 5
1103 THROUGH FILTER BAY SIEMENS REL 13C44
1104 TERMINAL BAY V212, GROUP 4
1105 GROUP DISTR SIEMENS REL 13P70A
1106 TERMINAL BAY V212, GROUP 3
1107 TERMINAL BAY V212, GROUP 3
1108 EM 120/400 TRANSMITTER
1109 V-60/120 FU
1110 EM 120/400 RECEIVER
1111 V-60/120 FU
1112 EM 120/400 TRANSMITTER
1113 GROUP PILOT SIEMENS REL 13C73A
1114 EM 120/400 RECEIVER

1201 GDF (AN/FCC-32) AUTODIN CONDITIONING
1202 48VAC STATION SUPPLY TELESIG 2266A
1203 STATION ATTENUATORS/IDF

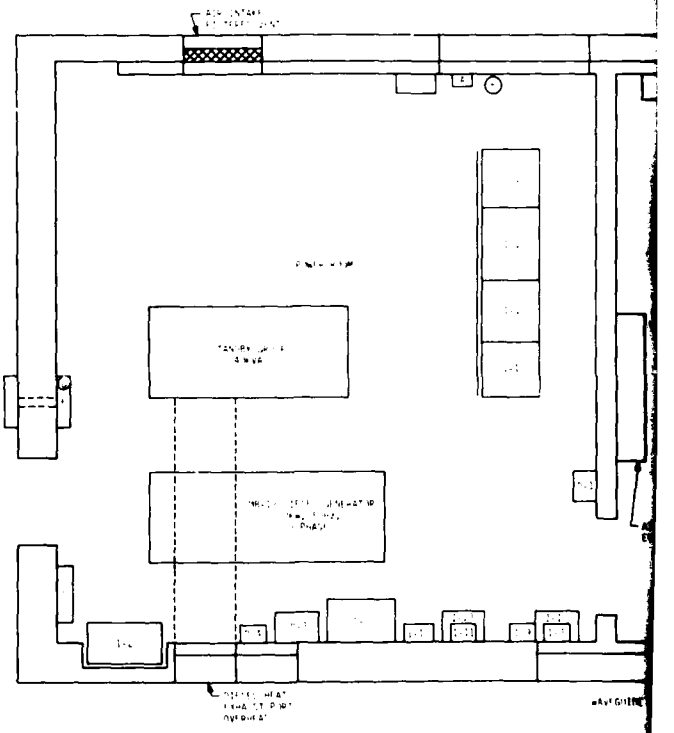
1302 AN/FCC-32, HF DF/4861
1303 AN/FCC-32, 60/120, BAY
1304 AN/FCC-32, 12 CHANNEL SPECIFICATION
1305 AN/FCC-32, CHANNEL TRANSMIT BAY
1306 AN/FCC-32, 12 CHANNEL SPECIFICATION
1307 AN/FCC-32, TGF AND GROUP BAY
1308 AN/FCC-32, 12 CHANNEL SPECIFICATION
1309 AN/FCC-32, DEL EQ BAY
1311 AUDIO VF PATCH TELESIG 2263S
1312 CAB TELESIG 2269A/AM-447G
1313 AUDIO CIRCUIT PATCH TELESIG 2263J
1314 TA-182, 2 EACH, AND DEHYDRATOR

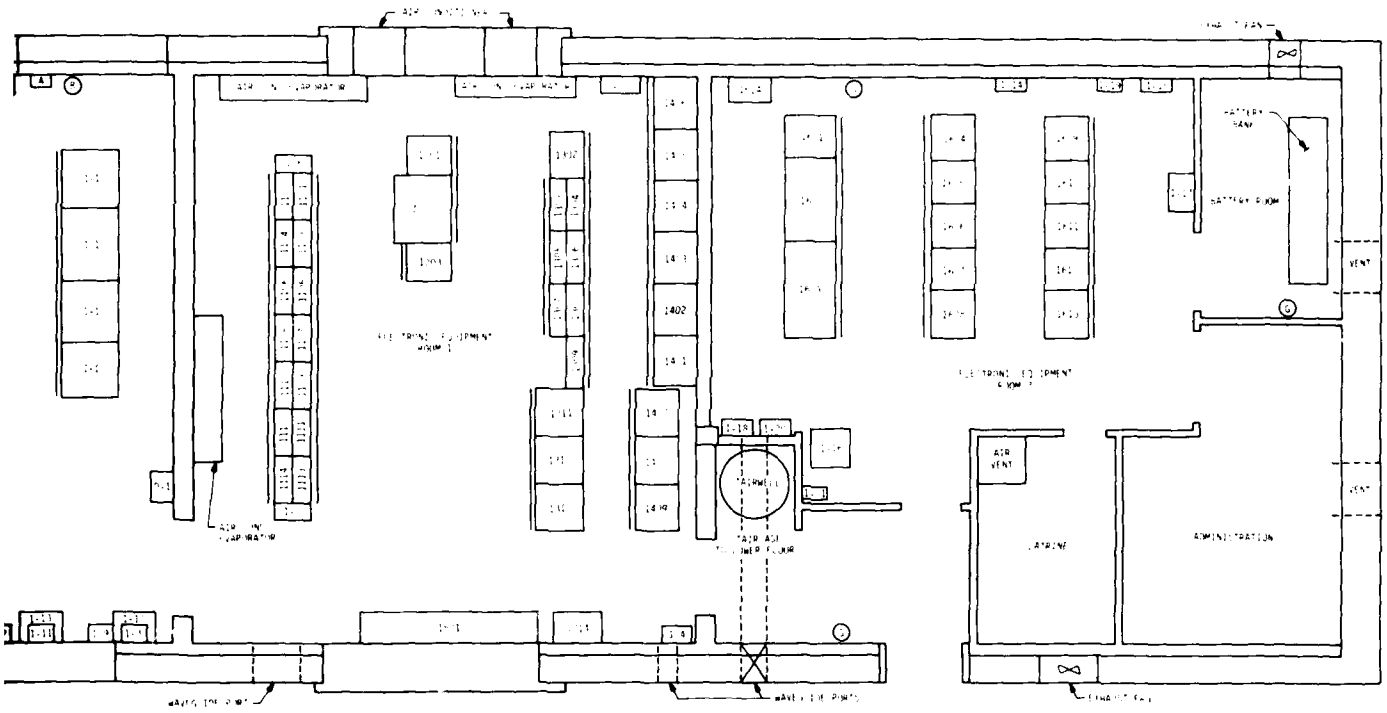
1401 FM12/800 TRANSMITTER HOT STANDBY
1402 TO BE REMOVED
1403 TO BE REMOVED
1404 TO BE REMOVED
1405 TO BE REMOVED
1406 FM12/800 TRANSMITTER HOT STANDBY
1407 MS-509E, AN/TRC-150 POWER SUPPLY
1408 MC-509E, AN/TRC-150 HOT STANDBY
1409 MS-509E, AN/TRC-150 HOT STANDBY

1501 DCF, 10 VERT, 5 BLOCKS/VERT

1601 AN/FRC-162(V)
1602 AN/FRC-165(V)
1603 AN/FRC-165(V)
1604 RADIO MISC BAY
1605 INTERMEDIATE DISTRIBUTION FRAME
1606 AN/FCC-97
1607 AN/FCC-97
1608 AN/FCC-97
1609 RECTIFIER BAY
1610 TSEC/CY-104A (PCM)
1611 TSEC/CY-104A (PCM)
1612 TSEC/CY-104A (PCM)
1613 TI PATCH & TEST BAY
1614 COMPRESSOR/DEHYDRATOR

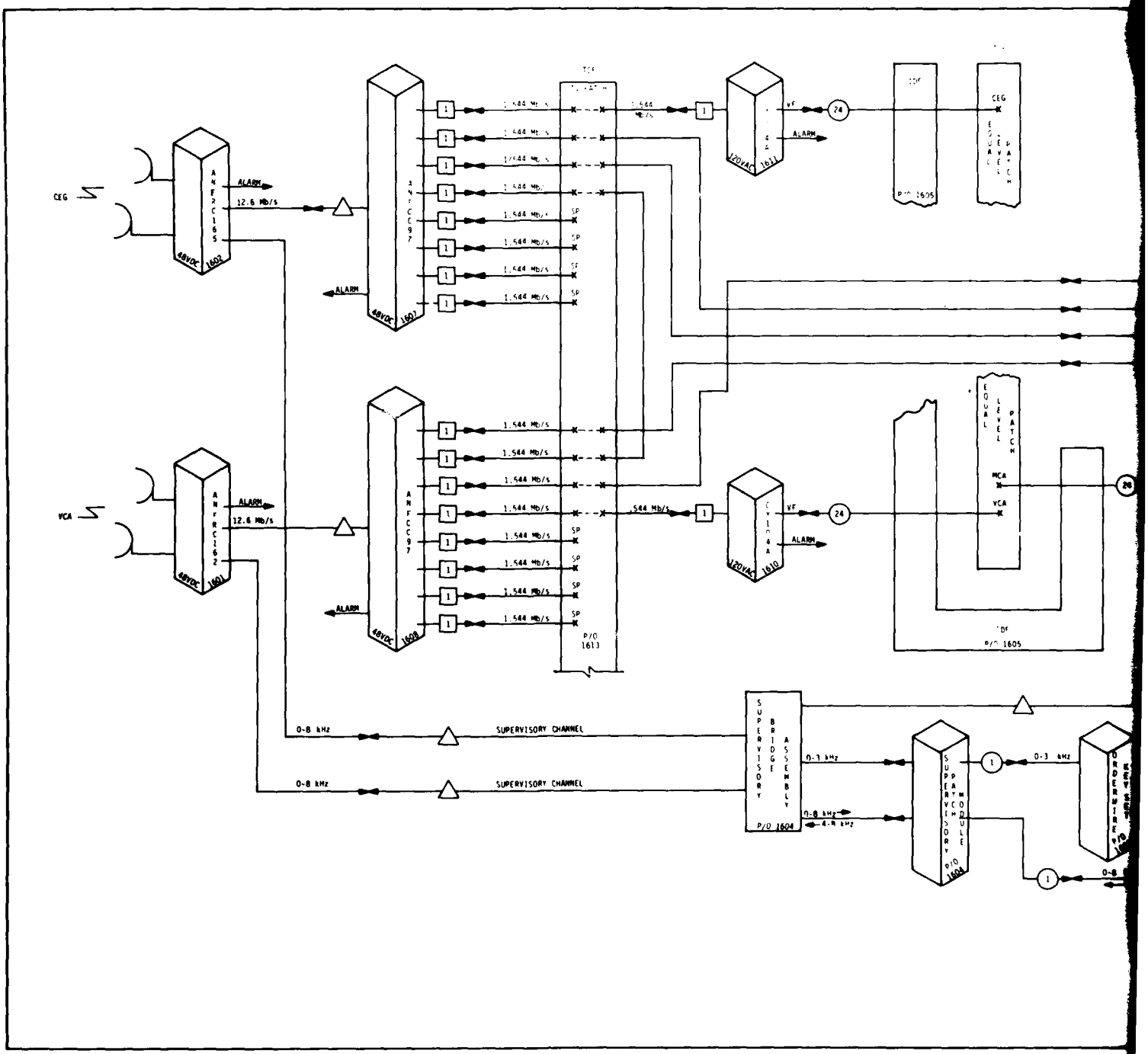
A VENTILATION CIRCUIT BREAKERS
B VENTILATION THERMOSTAT
C DIESEL HAND PUMP, FUEL CONTROL VALVES
D-1 PANEL "U" DEB TECH POWER
D-2 AUTO TRANSFER PANEL GENERATOR 2
D-3 AUXILLIARY POWER GENERATOR 2 BY-PASS
D-4 FUEL PUMP CONTROL PANEL
E PANEL, 220/380VAC, 3 PHASE
F TACTICAL INTERFACE JUNCTION BOX
G DC EMERGENCY LIGHTS

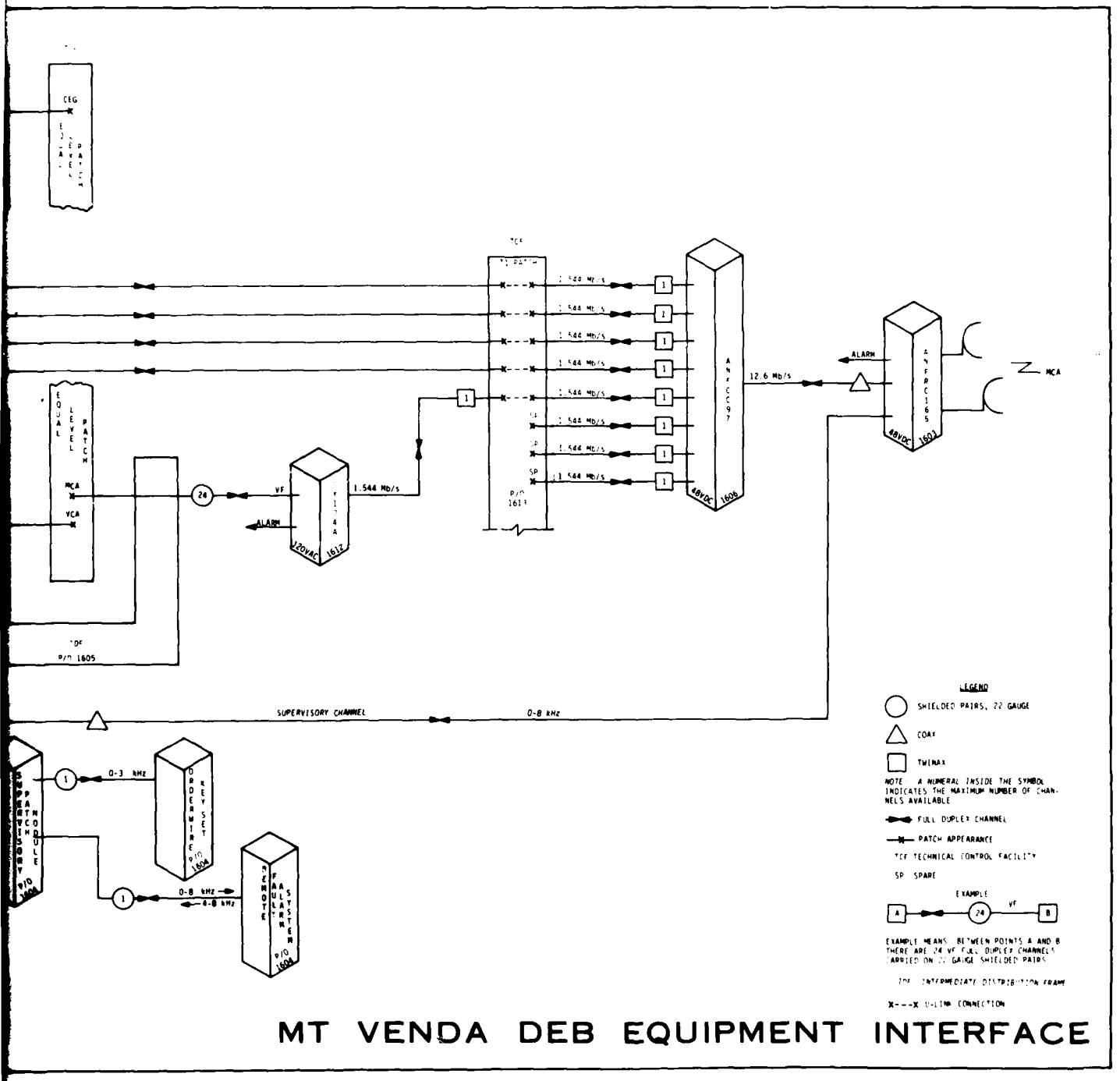




MT VENDA DEB FLOOR PLAN

Figure 43.





MT VENDA DEB EQUIPMENT INTERFACE

Figure 44.

2.2 Type I A Reconstitution Package (AN/GSC-47) Configurations

The Type I A Reconstitution Package will be used to restore Mt. Cimone, Paganella, Cima Gallina, and Zugspitze. It also will be employed to provide the third link at a three-way repeater (Section 2.1.3) and for a tactical interface "down-the-hill" link (Section 2.3.1).

Configurations for mountaintop sites, described in the following paragraphs, assume minimal equipment utilization and therefore omit references to interconnections for the transportable T1-4000 multiplexers. Baseband connections are simply receiver outputs to transmitter inputs. If digital regeneration is desired, then transportable TDM units must be brought up to the mountaintops and interconnections made, as shown in Figure 15 (page 43).

2.2.1 Cima Gallina VF Breakout

Cima Gallina is a two-way DEB repeater that has one digroup broken out from the backbone in each direction to provide VF connections for an analog radio link to Bressanone. For purposes of reconstitution, however, the site is treated as a simple repeater. Full restoration would require the addition of three transportable T1-4000 second level multiplexers and a third radio from another Type I A Reconstitution Package. In the event of complete station destruction, there would be no source of primary power, because the Type I A generators have insufficient capacity. The MEP-014A generator has a 500 watt capacity (derated to 335 watts at an altitude of 10,000 feet). When solid state amplifiers are needed, power consumption of the Type I A system (excluding the transportable T1-4000 second level multiplexers) will be approximately 350 watts, making it necessary to use two generators. Total available reserve power from two generators will be 320 watts. The three multiplexers and third radio required for full restoration of Cima Gallina would consume an additional 452 watts. In addition to a primary power shortage, there would be a problem in providing a heated shelter (since the transportable T1-4000 is not designed for exposure to mountaintop temperature variations). Also, there would be a decrease in reliability due to increased system complexity. For those reasons, and because the DEB is a secondary source of communication to Bressanone, it is impractical to temporarily restore the analog link.

2.2.2 Less Accessible Simple Repeaters

2.2.2.1 Mt. Cimone

(a) Site Data. The Mt. Cimone site plan, building floor plan and existing site equipment interface drawings are shown as Figures 45, 46, and 47, respectively.

(b) Reconstitution Data:

Type I A location - Knoll west of U.S. site building.

Antenna polarization - Horizontal (both links)

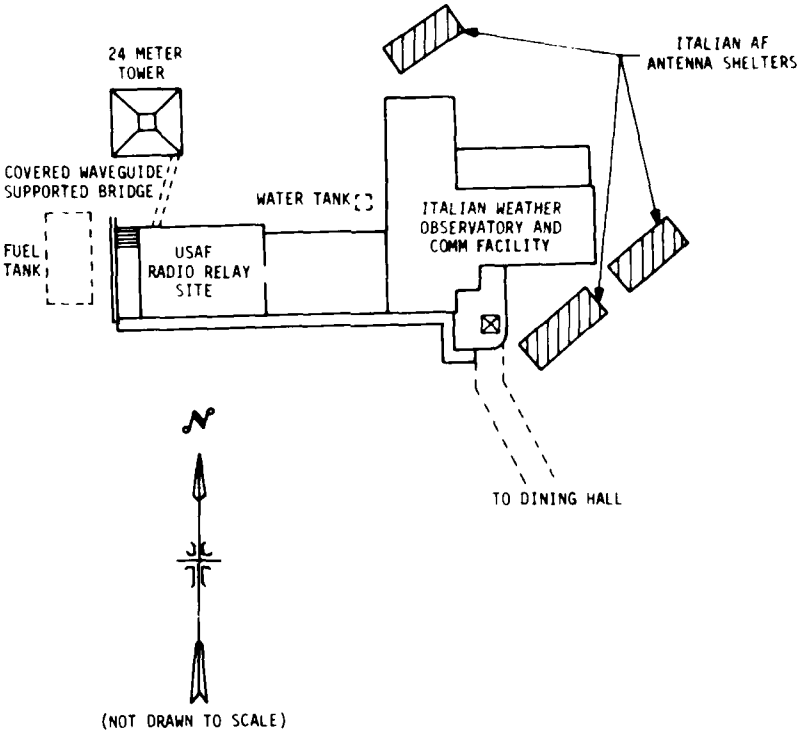
Antenna azimuths (true) -
Mt. Cimone to Mt. Corna - 354 degrees 16 minutes
Mt. Cimone to Mt. Serra - 193 degrees 23 minutes

Transmitter power - 2 watts (both links)

Orderwire address - 60

(c) Frequencies. Set the transmitter VCO, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Mt. Corna	8297.5	100219	8107.5	8037.5
Mt. Serra	8202.5	99031	8392.5	8322.5



SITE INFORMATION

COORDINATES

LATITUDE 44° 11' 40" N

LONGITUDE 10° 42' 05" E

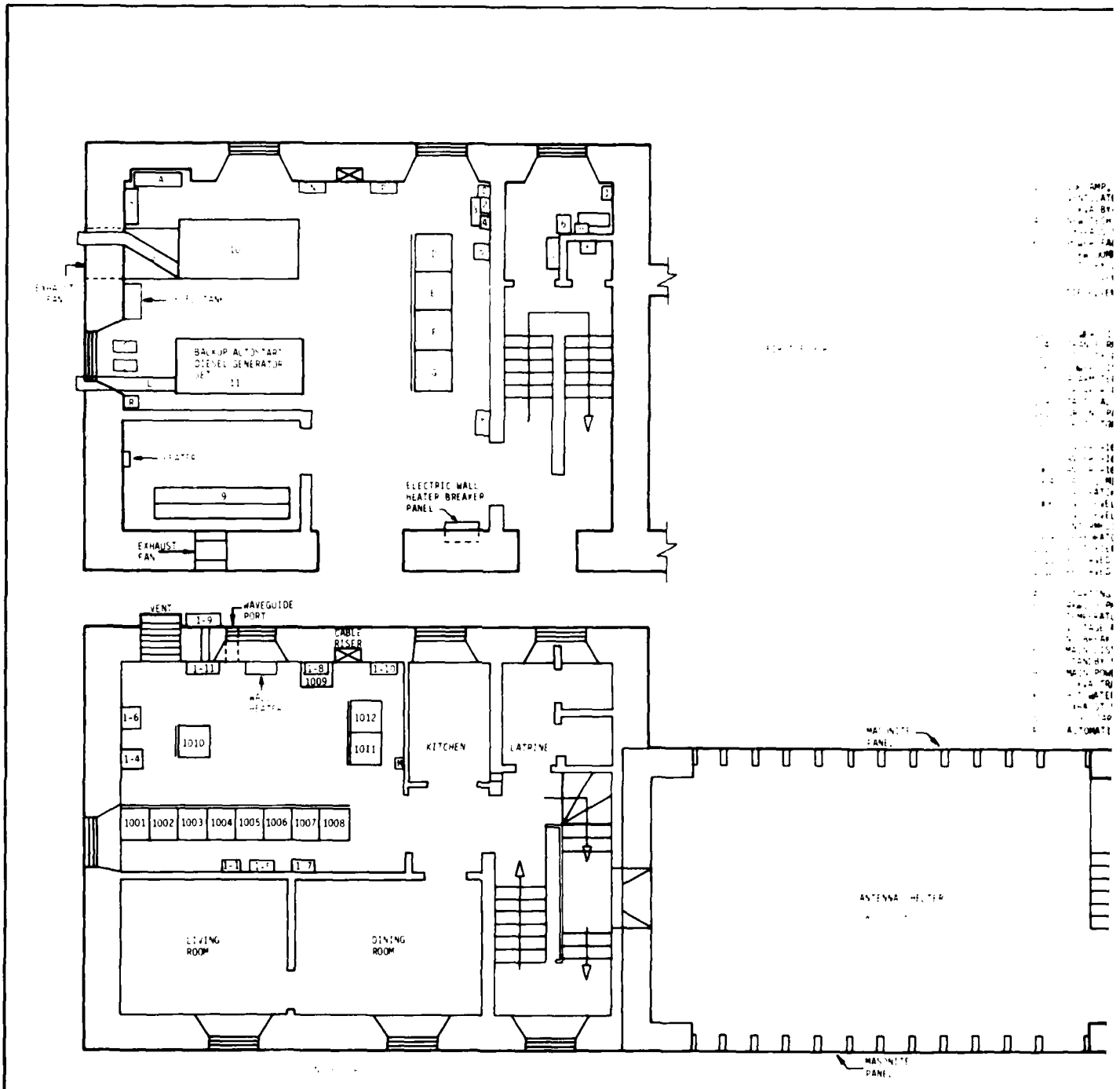
ELEVATION 2150 METERS

ANTENNA INFORMATION

1. MT CIMONE TO MT CORNA
   - A. AZIMUTH/DISTANCE: 354° 15' 36"/132.5 KILOMETERS
   - B. TYPE/DIAMETER: PARABOLIC/3.2 METERS
   - C. HEIGHT ABOVE GROUND: 21.9 METERS (XMT/RCV)
     12.8 METERS (RCV ONLY)

2. MT CIMONE TO MT SERRA
   - A. AZIMUTH/DISTANCE: 193° 23' 18"/50.8 KILOMETERS
   - B. TYPE/DIAMETER: PARABOLIC/3.2 METERS
   - C. HEIGHT ABOVE GROUND: 15.2 METERS (XMT/RCV)
     6.1 METERS (RCV ONLY)

Figure 45. Mt. Cimone Site Plan



MT CIMONE D

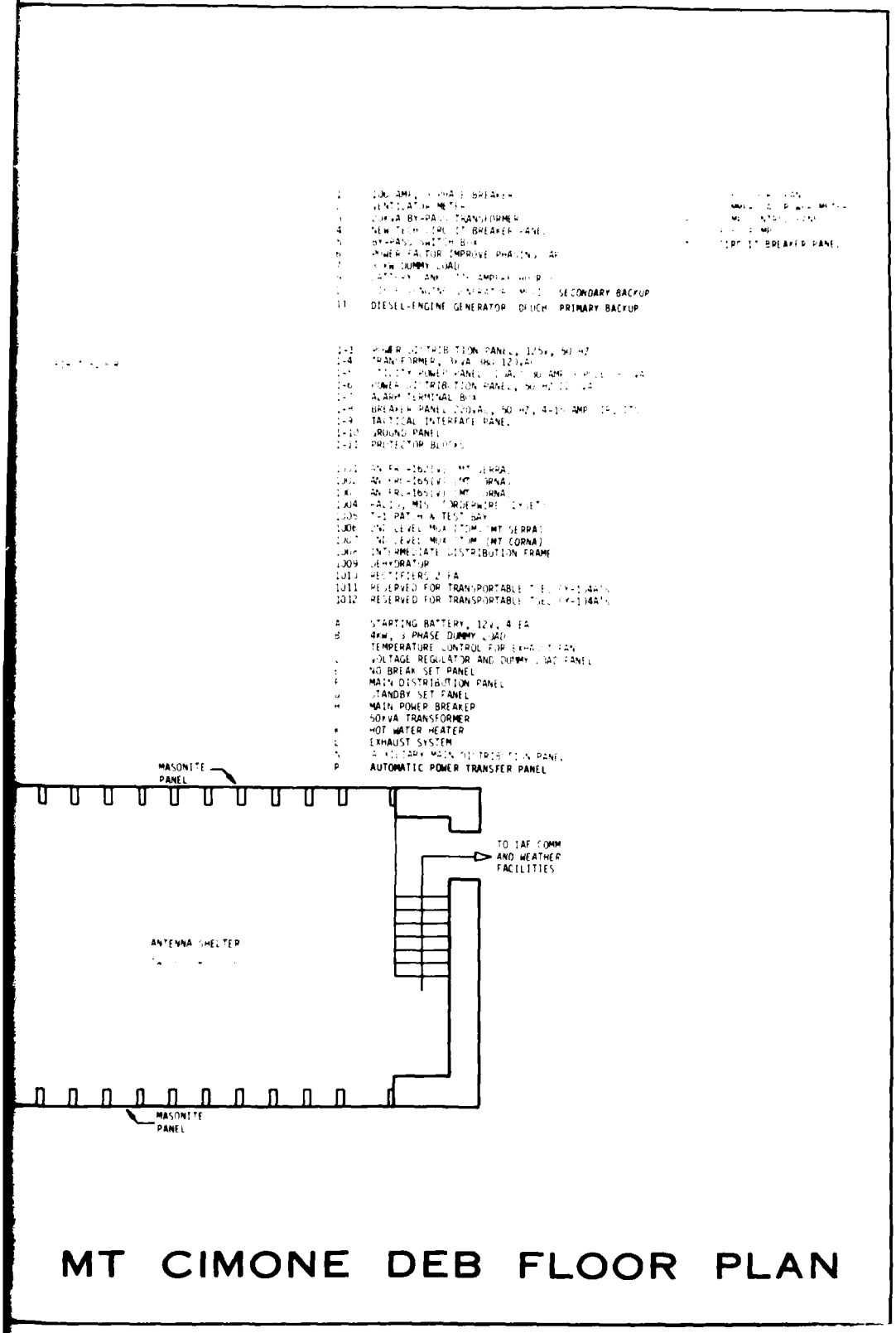
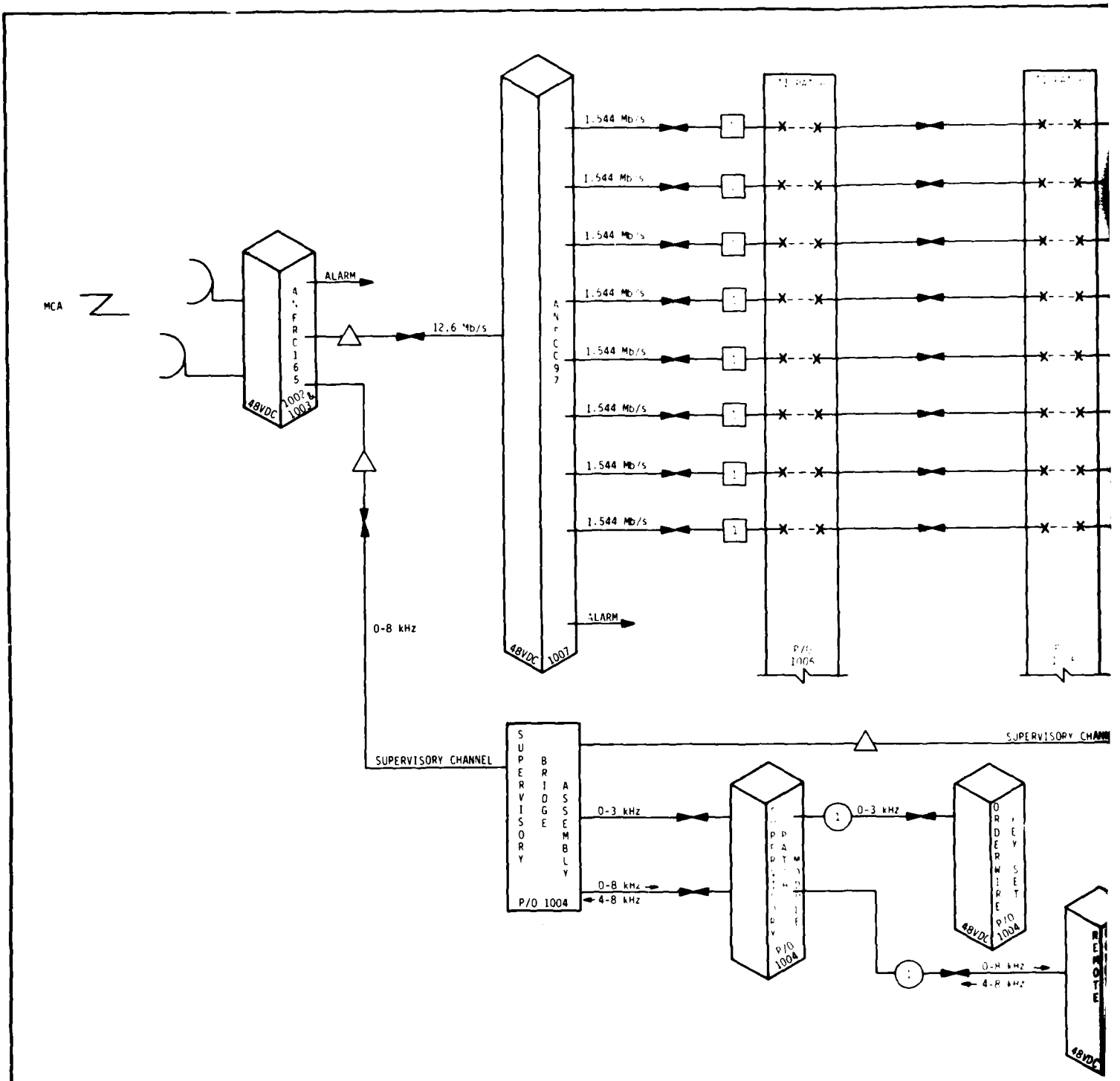

MASONITE PANEL
TO IAF COMM AND WEATHER FACILITIES
ANTENNA SHELTER
MASONITE PANEL
MT CIMONE DEB FLOOR PLAN

Figure 46.



MT CIMO

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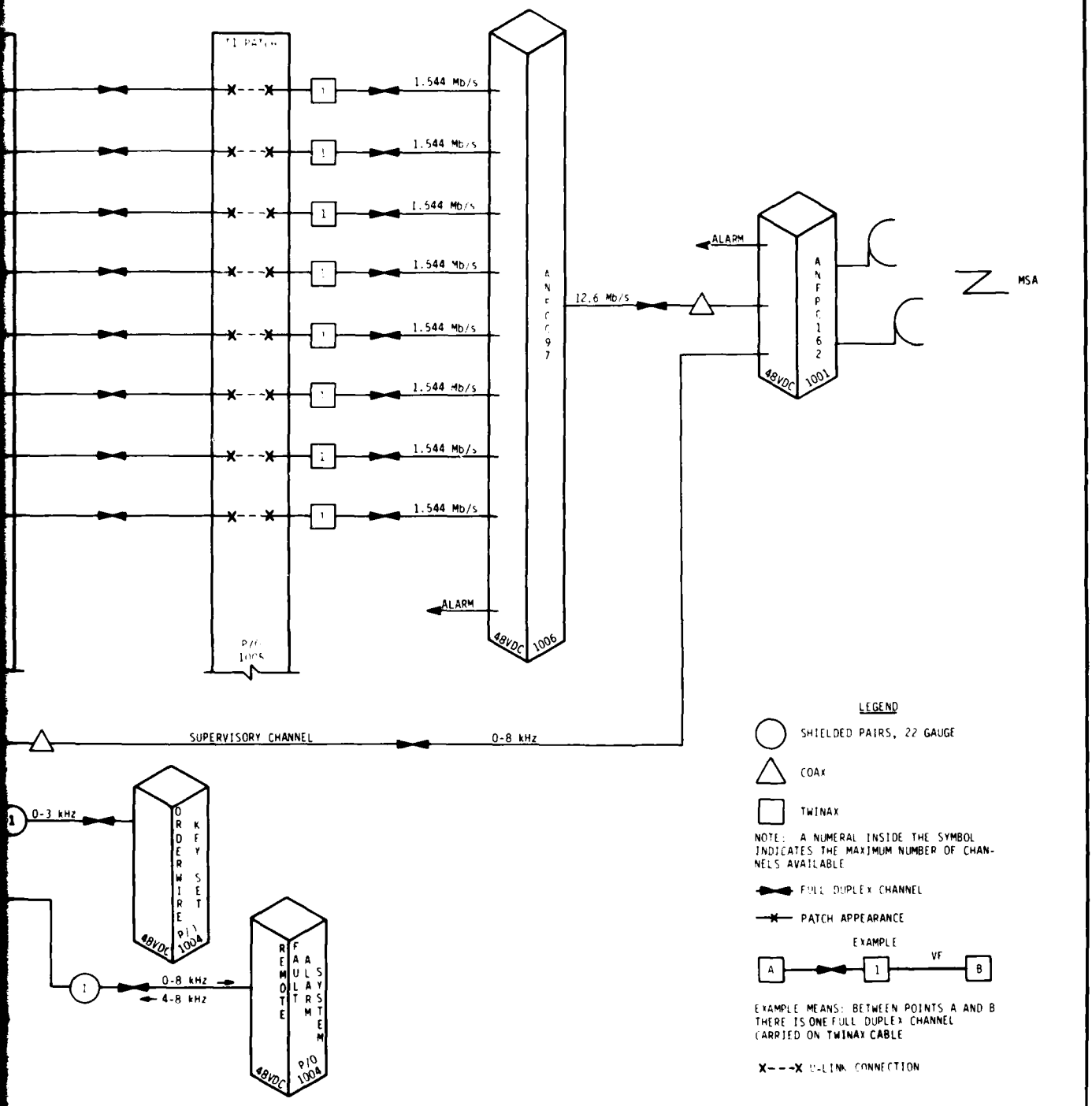


MT CIMONE DEB EQUIPMENT INTERFACE

Figure 47.

2.2.2.2 Paganella

(a) Site Data. The Paganella site plan, building floor plan and existing site equipment interface drawings are shown as Figures 48, 49, and 50, respectively.

(b) Reconstitution Data:

Type I A location - Any nearby high point north or west of the site.

Antenna polarization - Horizontal (both links)

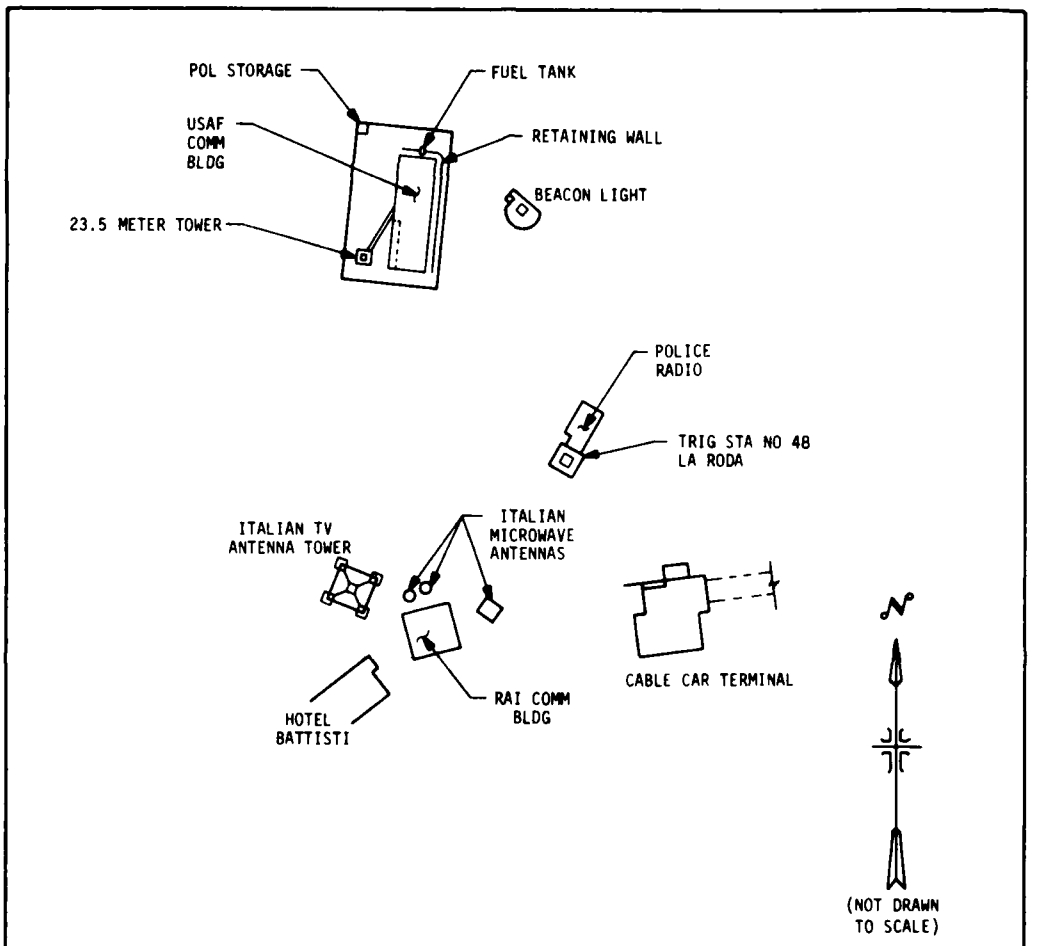
Antenna azimuths (true) -
Paganella to Cima Gallina - 21 degrees 14 minutes
Paganella to Mt. Corna - 205 degrees 16 minutes

Transmitter power - 2 watts (both links)

Orderwire address - 65

(c) Frequencies. Set the transmitter VCO, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Cima Gallina	8297.5	100219	8107.5	8037.5
Mt. Corna	8392.5	101406	8202.5	8132.5



SITE INFORMATION
COORDINATES
LATITUDE 46° 08' 24" N
LONGITUDE 11° 02' 28" E

ELEVATION 2125 METERS

ANTENNA INFORMATION
1. PAGANELLA TO CIMA GALLINA
   A. AZIMUTH/DISTANCE: 21° 14'/154.5 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/2.4 METERS
   C. HEIGHT ABOVE GROUND: 17.7 METERS (XMT/RCV)
      9.1 METERS (RCV ONLY)

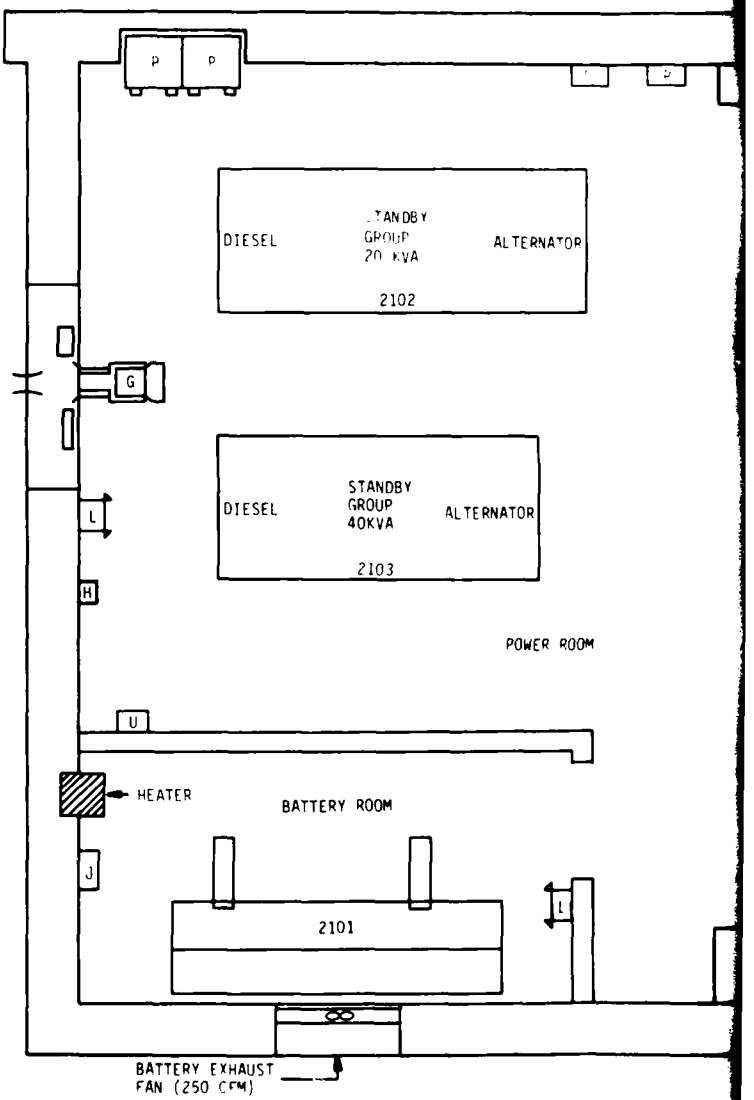
2. PAGANELLA TO MT CORNA
   A. AZIMUTH/DISTANCE: 205° 17' / 95.0 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/2.4 METERS
   C. HEIGHT ABOVE GROUND: 17.7 METERS (XMT/RCV)
      9.1 METERS (RCV ONLY)

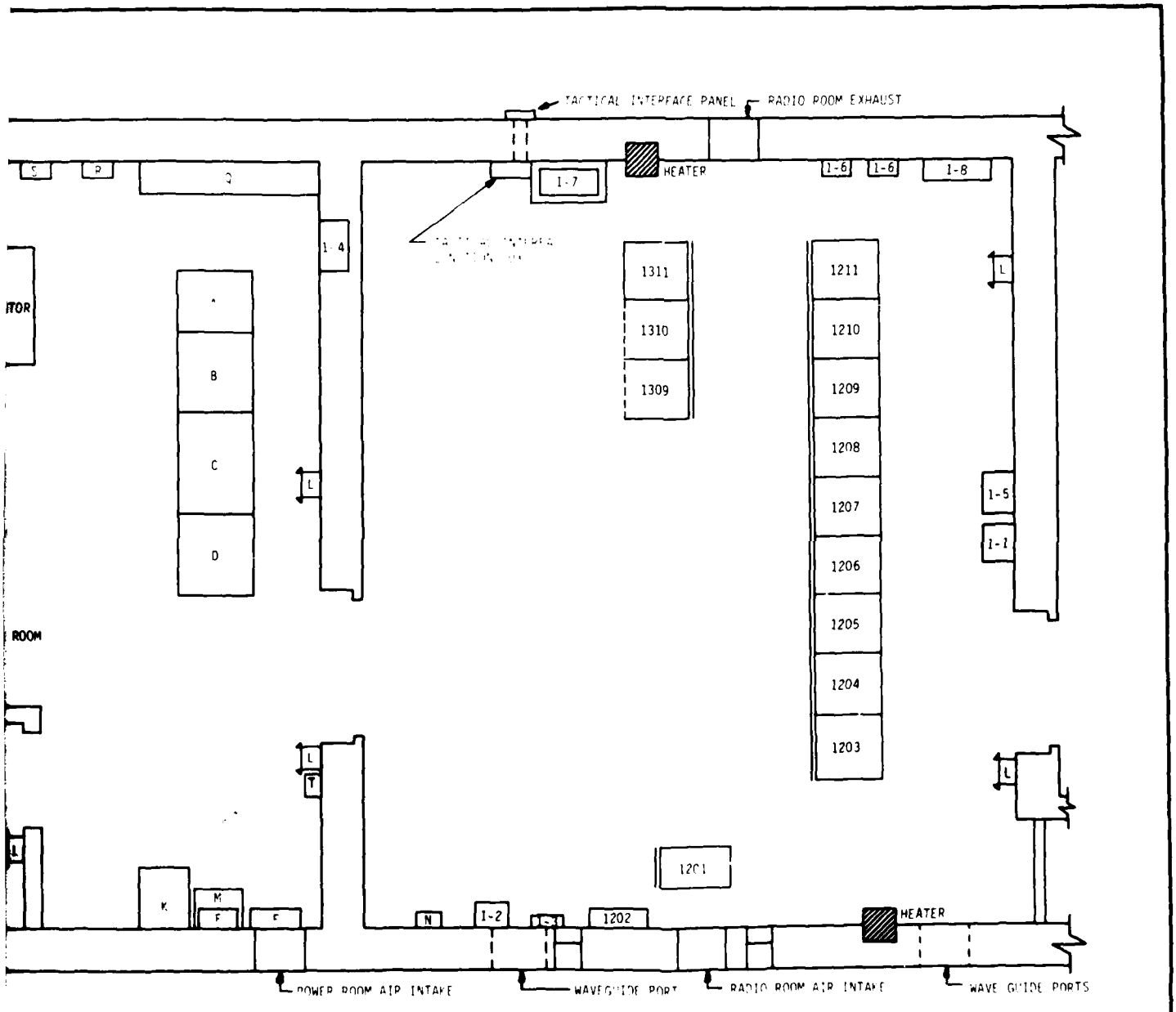
Figure 48. Paganella Site Plan

1-1 POWER PANEL, UTILITY, 380/220VAC
1-2 COMBINED DISTRIBUTION FRAME, 4 BLOCKS
1-3 POWER DISTRIBUTION PANEL 115V, 50 HZ
1-4 COMMERCIAL POWER CIRCUIT BREAKER
1-5 SNOW MELTING ELEMENT CONTROL
1-6 RECTIFIER FEEDER BREAKERS
1-7 AC DISTRIBUTION PANEL & 1KVA, 120VAC TRANSFORMER
1-8 ALARM TERMINAL BOX
1201 REGULATED POWER SUPPLY, 48 VDC, 15 AMP
1202 DEHYDRATOR
1203 AN/FRC-165, (CIMA GALLINA)
1204 AN/FRC-165, (CIMA GALLINA)
1205 AN/FRC-165, (MT CORNA)
1206 AN/FRC-165, (MT CORNA)
1207 RADIO MISCELLANEOUS BAY
1208 SECOND LEVEL MULTIPLEXER (TDM) (CIMA GALLINA)
1209 SECOND LEVEL MULTIPLEXER (TDM) (MT CORNA)
1210 T1 PATCH AND TEST BAY
1211 RECTIFIER #1 & #2

1309 TSEC-CY-104A (PCM) TRANSPORTABLE
1310 TSEC/CY-104A (PCM) TRANSPORTABLE
1311 INTERMEDIATE DISTRIBUTION FRAME

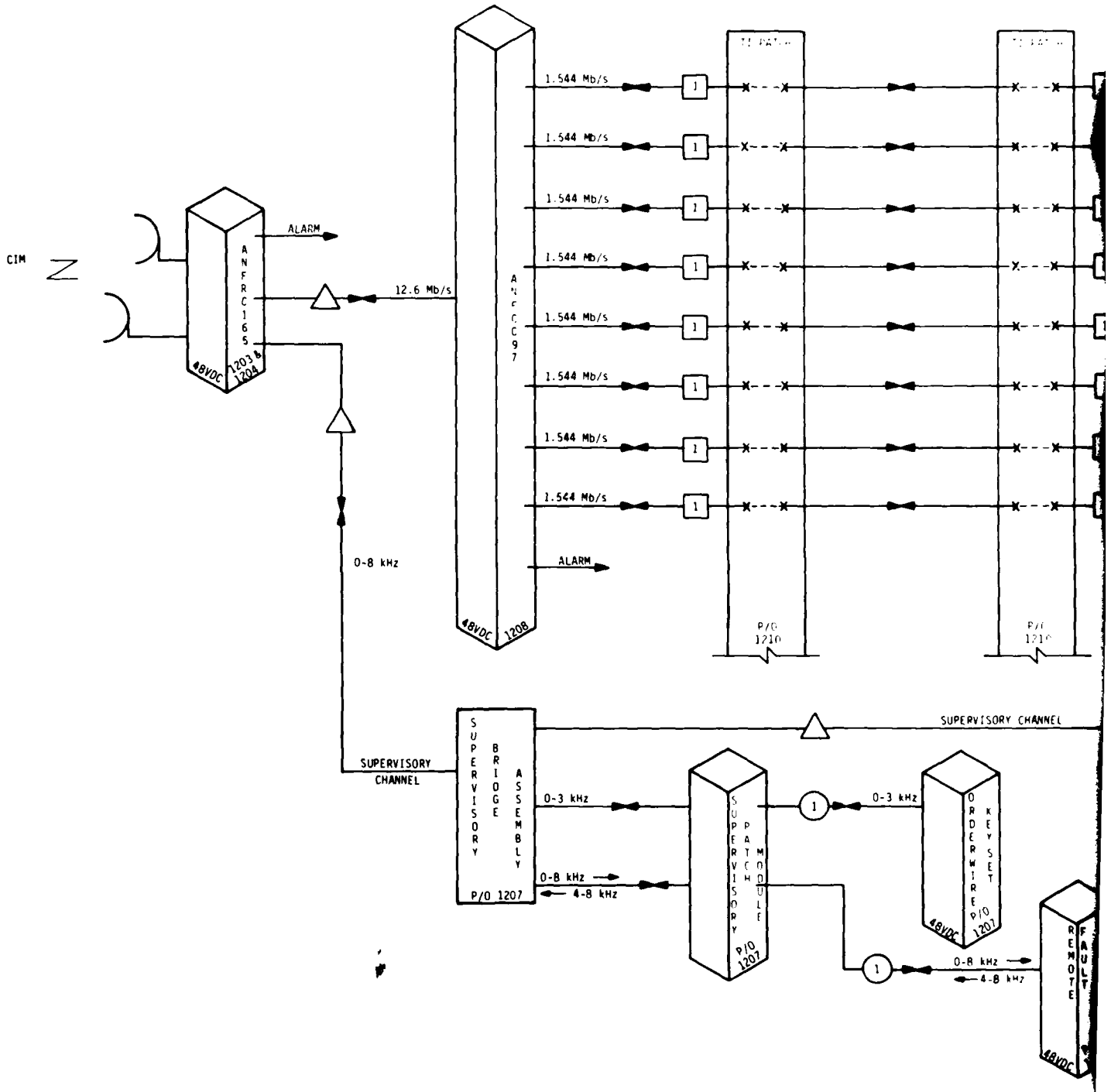
2101 BATTERY BANK (885 AMPERE HOUR)
2102 20 KVA CONTINUITY GROUP
2103 40 KVA CONTINUITY GROUP
A VOLTAGE REGULATOR AND VENT CONTROL PANEL
B CONTINUITY SET PANEL, TYPE AGLV/1
C MAIN DISTRIBUTION PANEL, TYPE ARDA/2
D STANDBY SET PANEL, TYPE AGEA/4
E DISTRIBUTION PANEL, 380/220/110VAC
F BY-PASS SWITCH, 100 AMP
G ELECTRIC VENTILATOR
H HAND FUEL PUMP
J VENTILATOR CONTROL
K LOAD BANK 30, 4 KW
L EMERGENCY LIGHTS
M 20 KVA, DRY TRANSFORMER, BY-PASS SYSTEM
N GROUND
P STARTING BATTERY 24VAC
Q POWER DISTRIBUTION PANEL, CIRCUIT BREAKERS; TRANSFORMER 380-220/127VAC
R AUTOMATIC POWER TRANSFER PANEL
S AUX CONT. PANEL (MB-18)
T DEB UTILITY PANEL "U"
U PUMP CONTROL PANEL



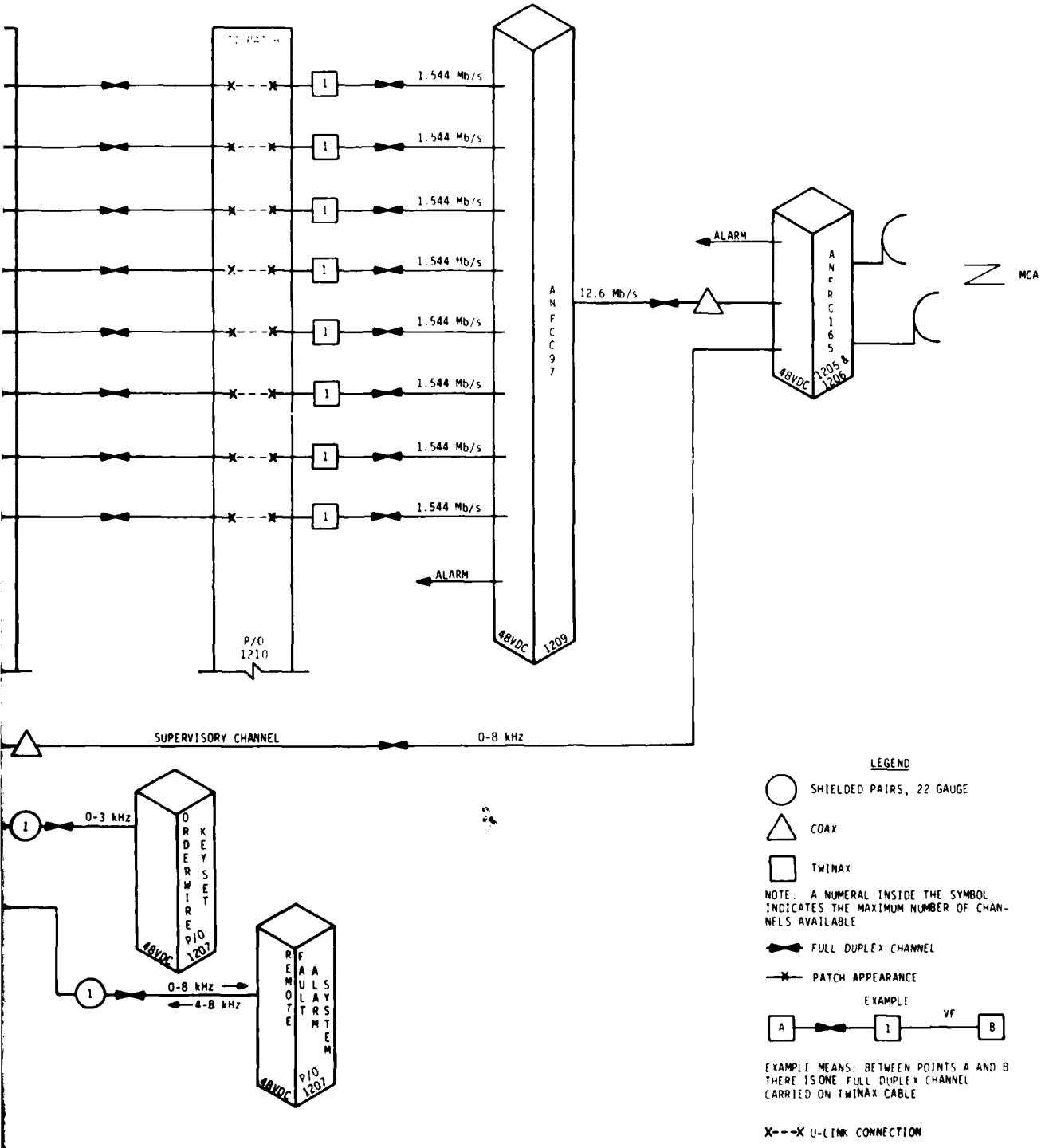


PAGANELLA DEB FLOOR PLAN

Figure 49.



PAGANELL



PAGANELLA DEB EQUIPMENT INTERFACE

Figure 50.

2.2.2.3 Cima Gallina

(a) Site Data. The Cima Gallina site plan, building floor plan and existing site equipment interface drawings are shown as Figures 51, 52, and 53, respectively.

(b) Reconstitution Data:

Type I A location - Any convenient high point east of the site.

Antenna polarization - Horizontal (both links)

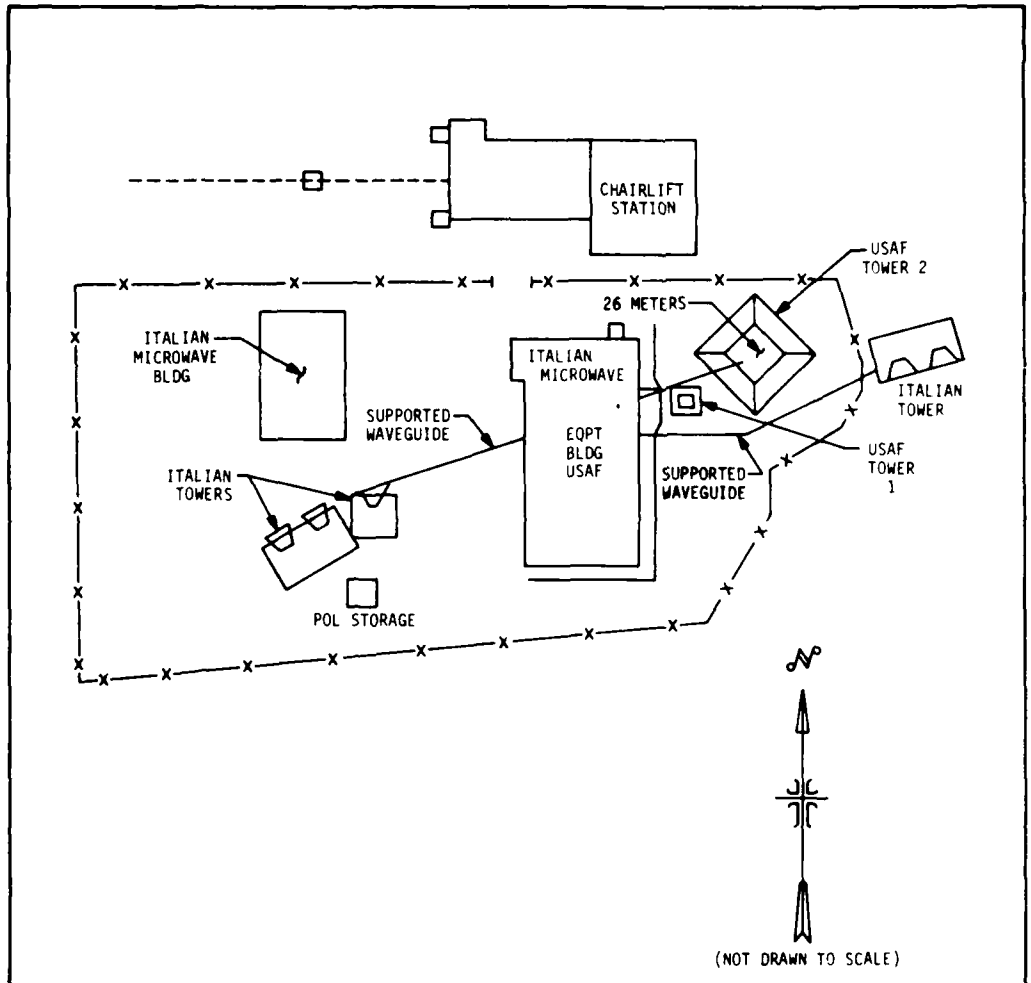
Antenna azimuths (true)-
Cima Gallina to Zugspitze - 324 degrees 2 minutes
Cima Gallina to Paganella - 201 degrees 34 minutes

Transmitter power - 2 watts (both links)

Orderwire address - 66

(c) Frequencies. Set the transmitter VCO, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Zugspitze	8233.372	99417	8384.986	8314.986
Paganella	8107.5	97844	8297.5	8227.5



SITE INFORMATION
COORDINATES
LATITUDE 46° 56' 39" N
LONGITUDE 11° 30' 50" E

ELEVATION 2680 METERS

ANTENNA INFORMATION
1. CIMA GALLINA TO ZUGSPITZE
   A. AZIMUTH/DISTANCE: 324° 43' / 159.3 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/1.9 METERS
   C. HEIGHT ABOVE GROUND: 16.8 METERS (XMT/RCV)
      7.6 METERS (RCV ONLY)

2. CIMA GALLINA TO PAGANELLA
   A. AZIMUTH/DISTANCE: 201° 34' / 117.5 KILOMETERS
   B. TYPE/DIAMETER: PARABOLIC/2.5 METERS
   C. HEIGHT ABOVE GROUND: 16.8 METERS (XMT/RCV)
      7.6 METERS (RCV ONLY)

Figure 51. Cima Gallina Site Plan

1-1 PANEL, AC 120 VOLT
1-4 ALARM TERMINAL PANEL
1-5 PANEL 120VAC
1-6 BREAKER RECTIFIER #1
1-7 BREAKER RECTIFIER #2
1-8 TRANSFORMER TEST, 120VAC. 3KVA
1-9 ROUND JUNCTION BOX
1-10 PROTECTOR BLOCK
1-11 TACTICAL INTERFACE PANEL
1-12 UTILITY PANEL
1-13 380/220/110VAC BREAKER AND TRANSFORMER
1-14 380/220VAC, 300 AMP BREAKER

1101 AN/FCC-32, MW503A, FREQUENCY DIVERSITY TERMINAL
1102 AN/FCC-32, HIGH FREQUENCY DISTRIBUTION FRAME AND TEST
1103 AN/FCC-32, 12 CHANNEL COMBINATION

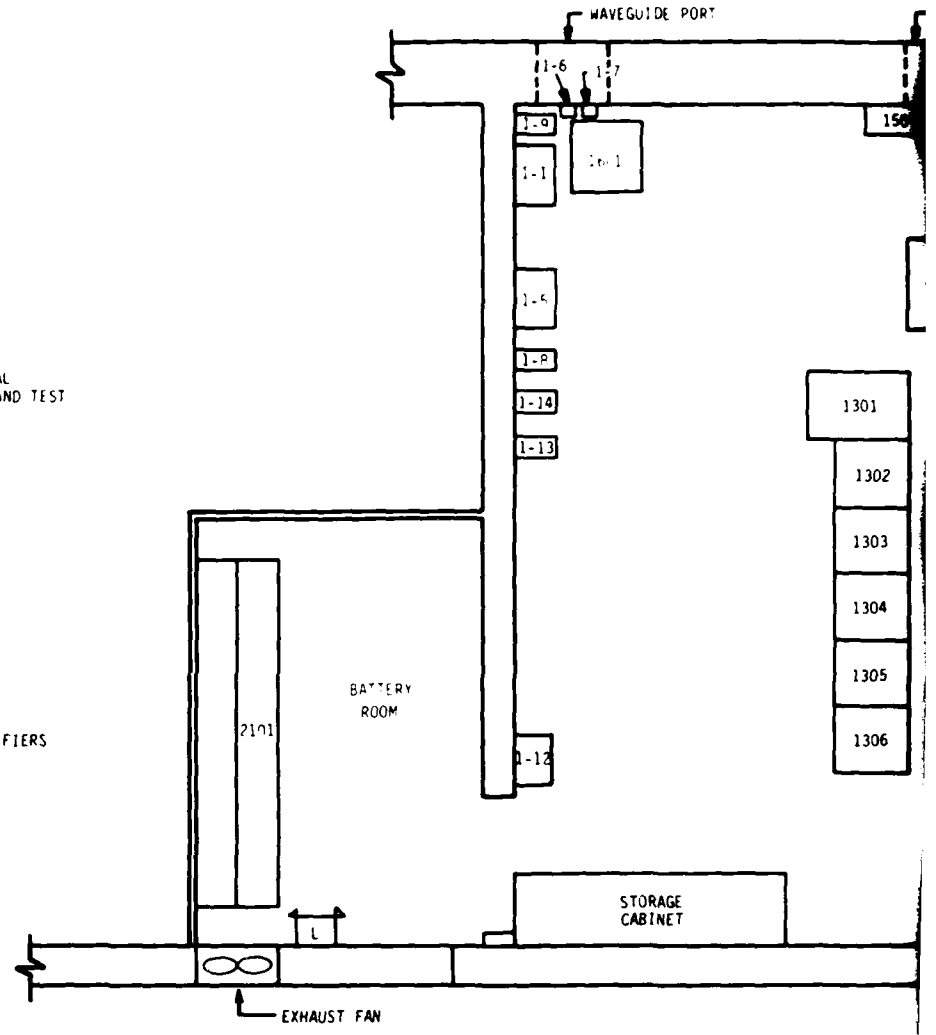
1301 IDF CABINETS, 10 HORIZ,4 BLOCKS VERT
1302 VF PATCH, TELSIG 2263D
1303 VF PATCH, TELSIG 2269C
1304 ALARM & 48V POWER SUPPLIES, TELSIG 2266A
1305 T1 PATCH & TEST BAY
1306 SECOND LEVEL MULTIPLEXER (TDM) (PAGANELLA)

1401 AN/FRC-165(V) (ZUGSPITZE)
1402 AN/FRC-165(V) (ZUGSPITZE)
1403 AN/FRC-165(V) (PAGANELLA)
1404 AN/FRC-165(V) (PAGANELLA)
1405 RADIO MISCELLANEOUS
1406 SECOND LEVEL MULTIPLEXER (TDM) (ZUGSPITZE)

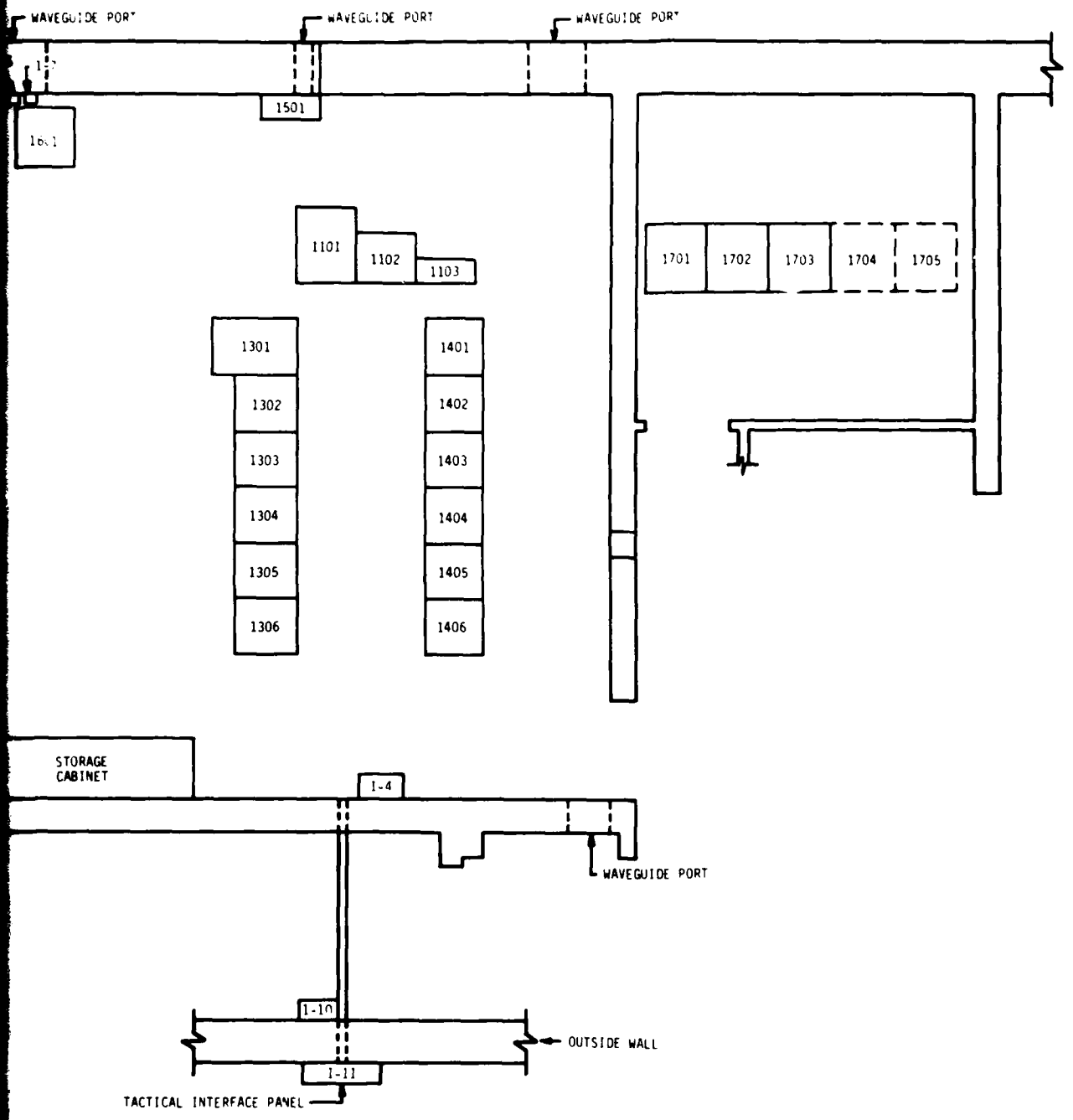
1501 DEHYDRATER

1601 UNINTERRUPTALBE POWER CONTROL BAY W/2 EA RECTIFIERS

1701 INTERMEDIATE DISTRIBUTION FRAM
1702 TSEC/CY-104 #1 (HOHENSTADT)
1703 TSEC/CY-104 #2 (MT CORNA)
1704 TRANSPORTABLE TSEC/CY-104
1705 TRANSPORTABLE TSEC/CY-104
1706
2101 BATTERY BANK (775 AMPERE HOUR)

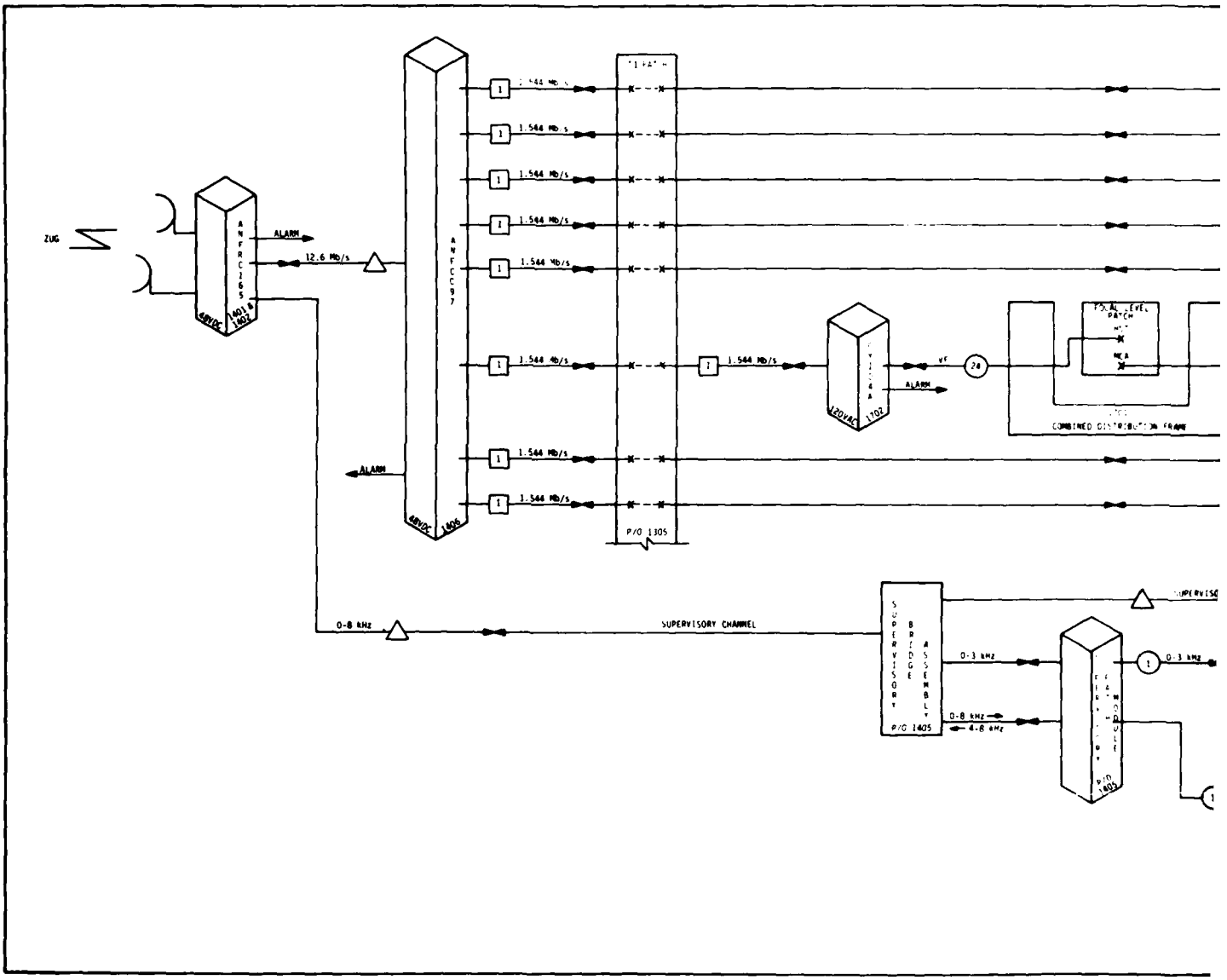


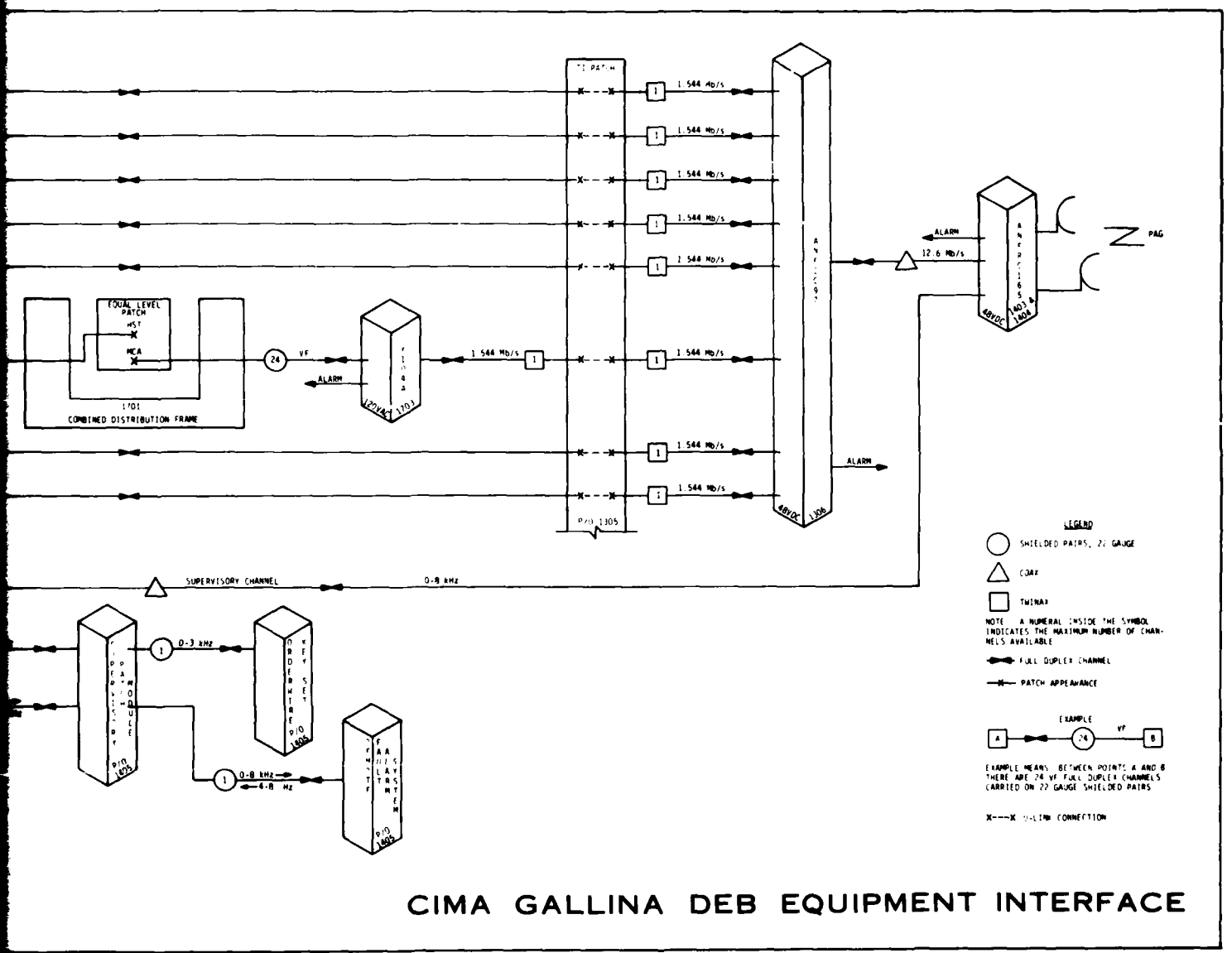
CI



CIMA GALLINA DEB FLOOR PLAN

Figure 52.





CIMA GALLINA DEB EQUIPMENT INTERFACE

Figure 53.

2.2.2.4 Zugspitze

(a) Site Data. The Zugspitze building floor plan and existing site equipment interface drawings are shown as Figures 54 and 55, respectively.

(b) Reconstitution Data:

Type I A location - Top of DEB equipment building or any convenient location on top of adjoining buildings.

Antenna polarization - Horizontal (both links)

Antenna azimuths (true) -
Zugspitze to Hohenstadt - 322 degrees 28 minutes
Zugspitze to Cima Gallina - 143 degrees 40 minutes

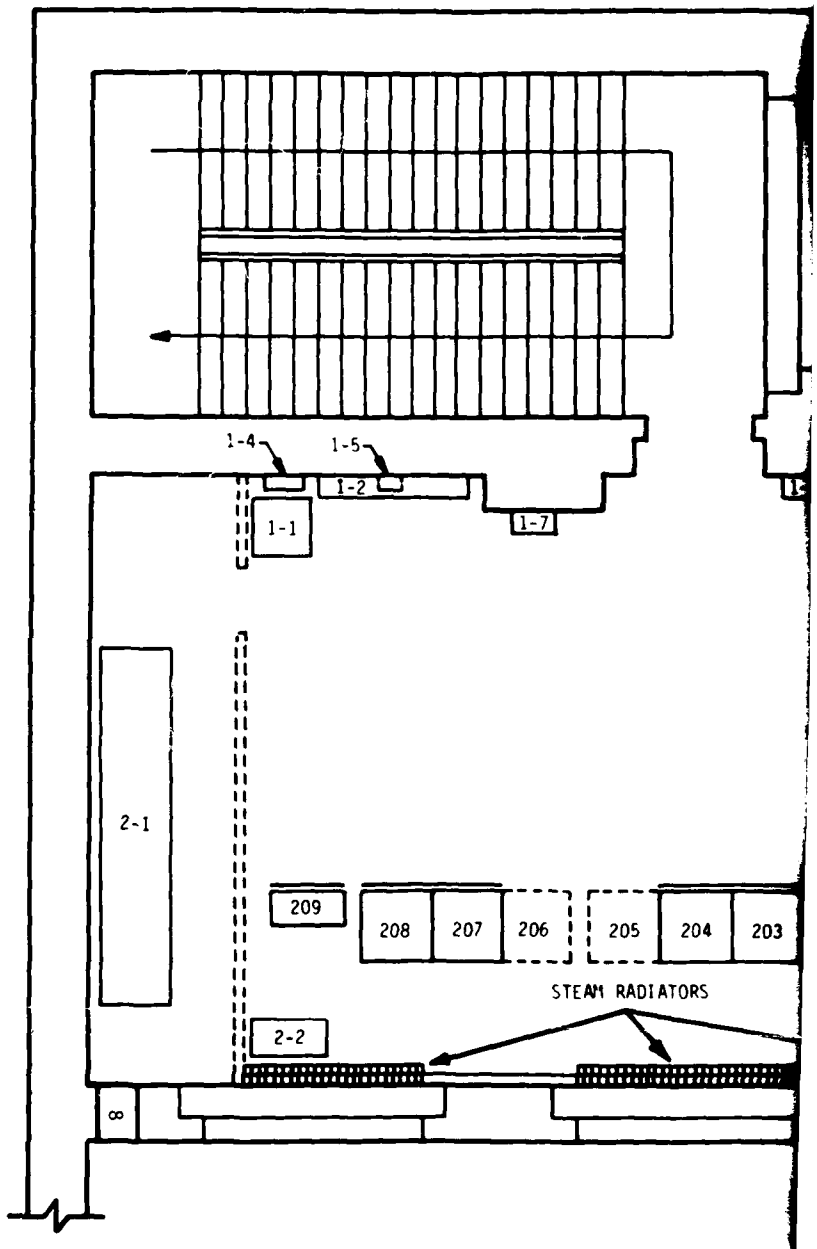
Transmitter power - 2 watts (both links)

Orderwire address - 34

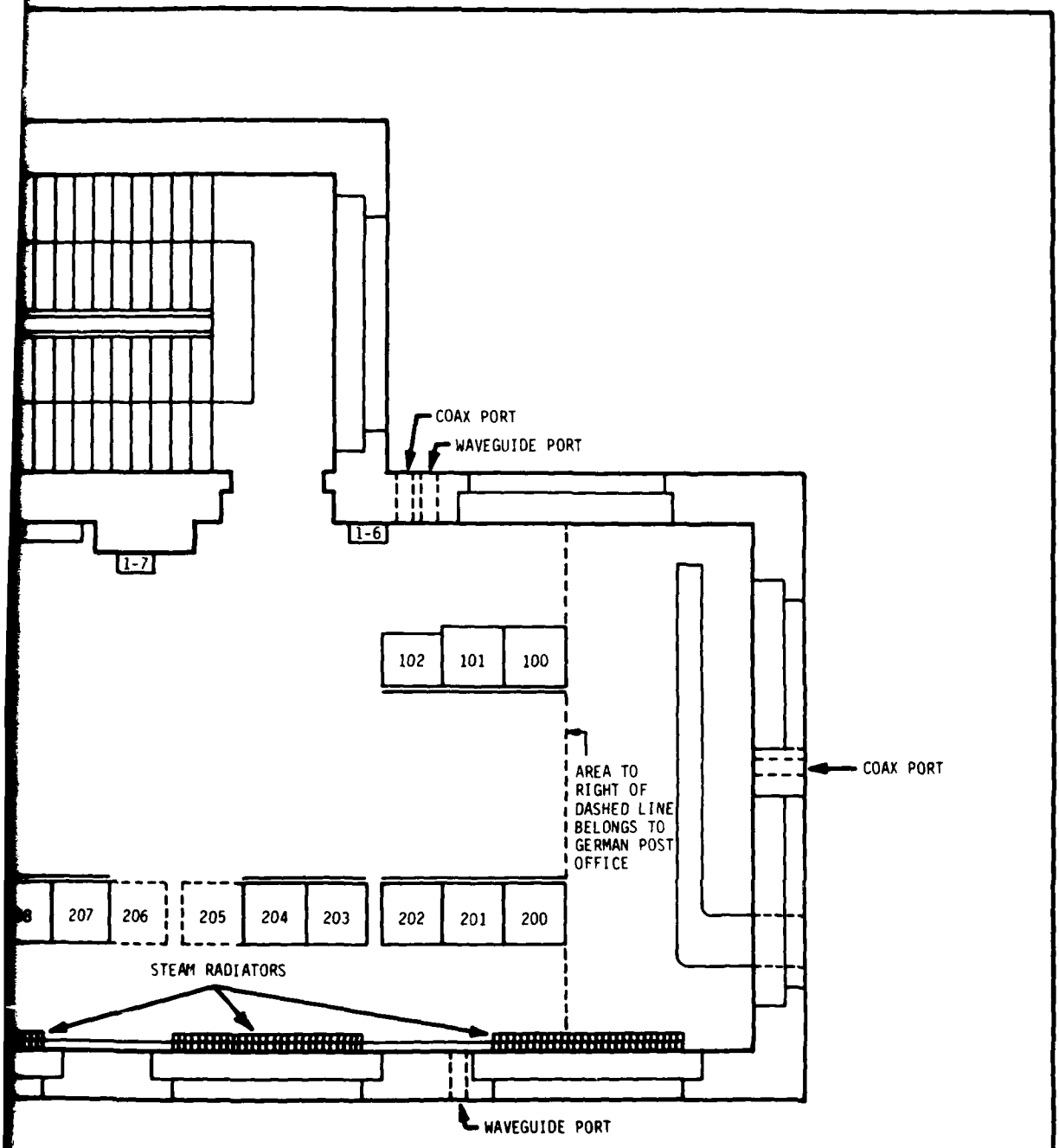
(c) Frequencies. Set the transmitter VCO, synthesizer thumbwheel switches, receiver preselector and receiver LO for each link as follows:

LINK	XMIT VCO (MHz)	SYNTH	RCV PRES (MHz)	RCV LO (MHz)
Hohenstadt	8309.5	100369	8148.5	8078.5
Cima Gallina	8384.986	101312	8233.372	8163.372

1-1	VOLTAGE REGULATOR 5KVA
1-2	POWER PANEL 380/220VAC, 50 HZ
1-4	REGULATOR FOR EXHAUST FAN
1-5	TRANSFORMER 220/120VAC 2KVA
1-6	ALARM BOX
2-1	BATTERY BANK
2-2	COMPRESSOR-DEHYDRATOR
100	AN/FRC-165 (HST)
101	AN/FRC-165 (HST)
102	RADIO MISC BAY
200	AN/FRC-165 (CIM)
201	AN/FRC-165 (CIM)
202	T1 PATCH AND TEST BAY
203	SECOND LEVEL MULTIPLEXER (HST)
204	SECOND LEVEL MULTIPLEXER (CIM)
205	RESERVED FOR TACTICAL MULTIPLEXER
206	RESERVED FOR TACTICAL MULTIPLEXER
207	INTERMEDIATE DISTRIBUTION FRAME
208	DC POWER DISTRIBUTION BAY
209	RECTIFIER BAY 2 EA, 208 VAC/54VDC, 100 AMP

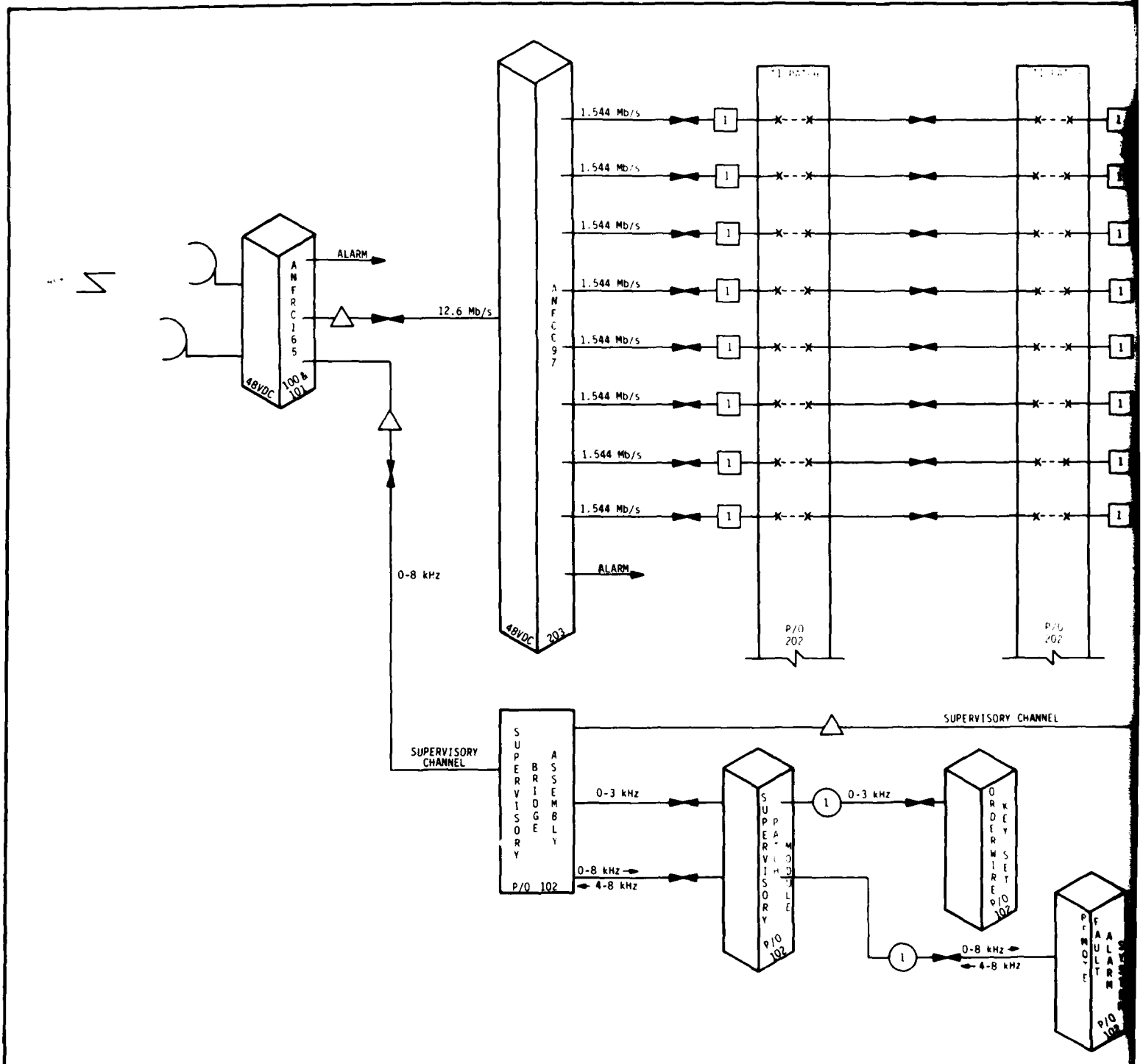


ZUGSF

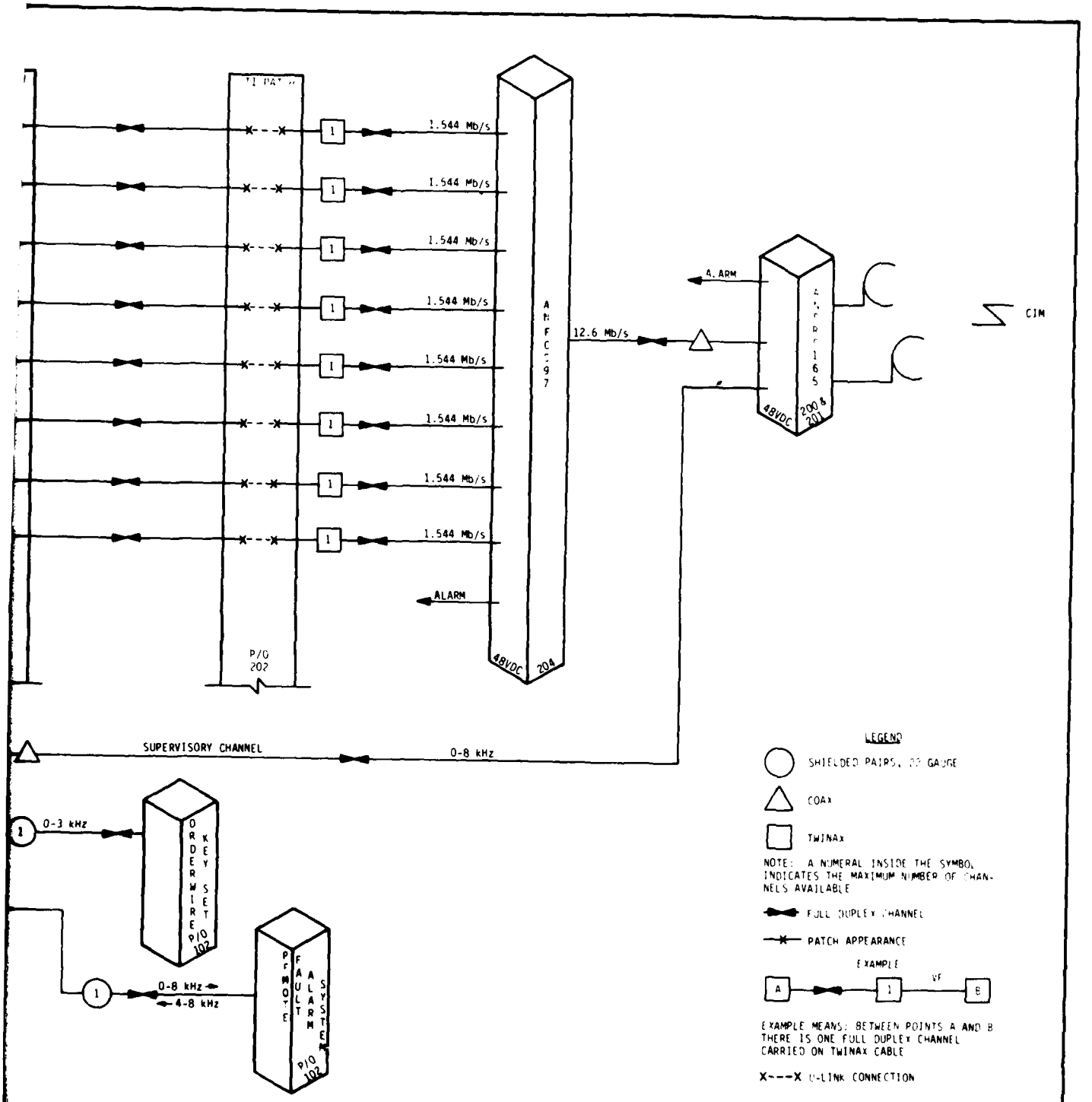


ZUGSPITZE DEB FLOOR PLAN

Figure 54.



ZUGSPITZ



ZUGSPITZE DEB EQUIPMENT INTERFACE

Figure 55.

2.3 Tactical Interface

At each DEB Stage I site, provisions are made to allow a tactical user access to DEB at voice frequency. A "Tactical Interface Panel", mounted on an outside wall of each site building, provides connections for 48 VF circuits which appear at a cable in the vicinity of the floor space designated for the transportable CY-104As (See Section 1.2.1.1.3.). At accessible repeaters, VF interconnect is afforded by interrupting a through digroup and inserting transportable first level multiplexers (CY-104As) to provide access in each direction. For less accessible repeaters, VF interconnect is provided at the outside wall of the Type I Reconstitution Package, which is positioned at a convenient location in an adjoining valley or nearby hilltop. Connection to DEB is accomplished by converting the simple repeater into a three-way repeater, by utilizing half of a Type I A Reconstitution Package to establish a "down-the-hill" link to the remote Type I Reconstitution Package. (See Figure 56.)

2.3.1 Down-the-Hill Link Configuration

To establish a down-the-hill link, the following equipment is required:

(1) Type I Reconstitution Package - The Type I Reconstitution Package radio should be configured as in Option 2 (Paragraph 1.2.1.1.1(j)). The assumptions are made that the tactical user will set up in a covert area and that the height afforded by the MAS will be sufficient to clear nearby obstructions, such as trees.

(2) Type I A Reconstitution Package - The Type I A Reconstitution Package is positioned at the repeater site, configured to include one transportable FCC-97, one radio, and one antenna. The transportable FCC-97 is positioned inside the site building. Baseband interconnections are made at the tactical interface panel connectors.

Recommended locations for the Type I A radio and antenna at Mt. Cimone, Cima Gallina, and Zugspitze are the same as for reconstitution. At Paganella, Type I A equipment should be positioned near the edge of the steep east face of the mountain. The following general areas are recommended as suitable for locating the Type I system in an adjoining valley:

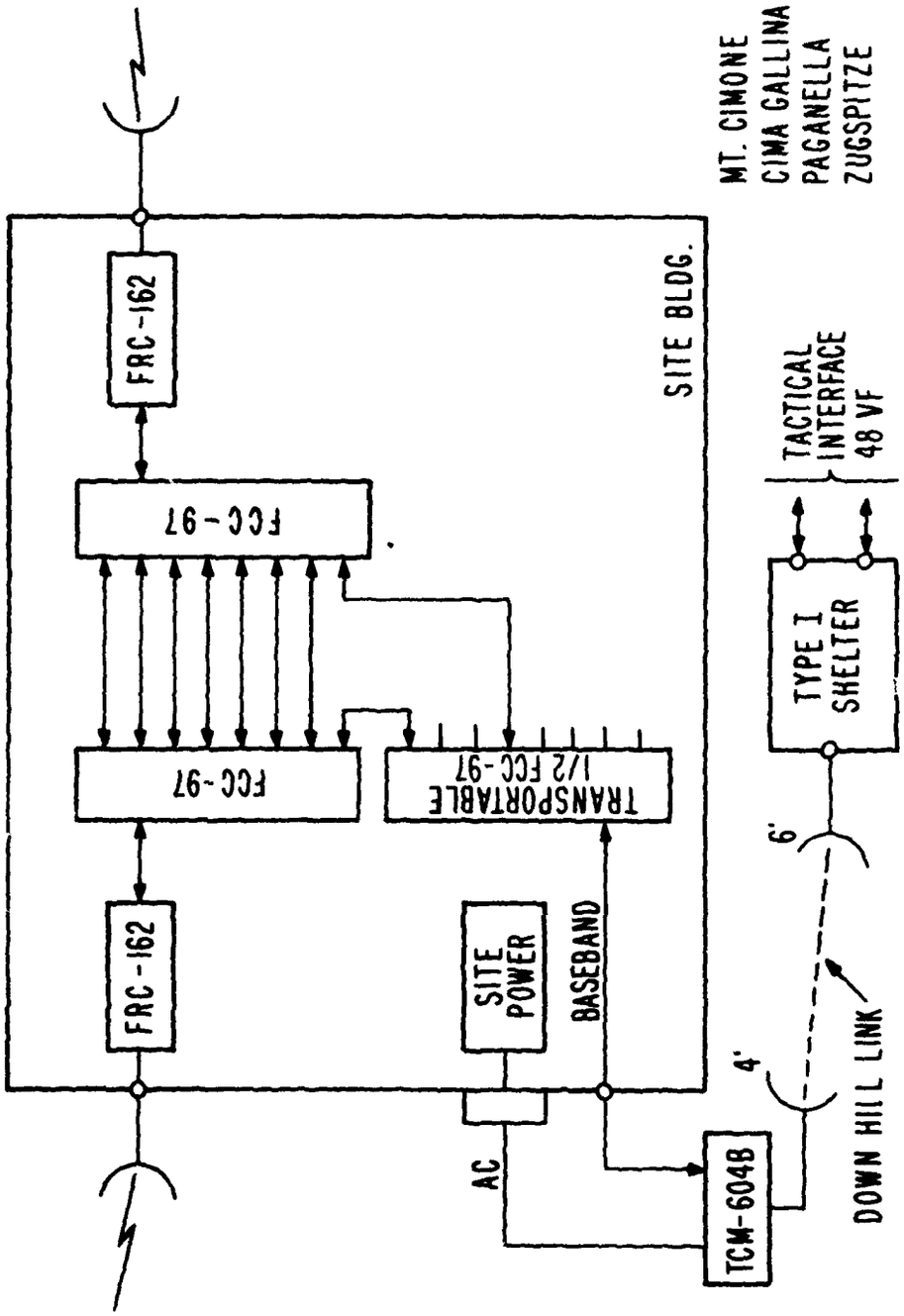


Figure 56. "Down-the-Hill" Link

Mt. Cimone - in or near the town of Abetone,
Paganella - the Funivia parking lot in
or near the town of Lavis,
Cima Gallina - in or near the town of Vipiteno,
Zugspitze - in or near the town of Murnau.

2.3.2 Transmitter Frequency

Since it is not possible to predict the frequencies that will be used for the down-the-hill link transmitters, synthesizer thumbwheel switch settings must be obtained from tables on the synthesizer side cover, or derived and set at deployment. If it is necessary to derive thumbwheel settings, use the following formula:

$$F_x=((F_o/4)-70)/N$$

where F_o = transmit frequency in MHz, F_x = synthesizer frequency (thumbwheel settings) in MHz (F_x must fall within 95-103 MHz), and N = multiplication factor. N may be any whole number from 18 through 21. Standard practice is to first try 20. If the transmitter will not lock up, try another number. A simple calculation will reveal the multiplication factor (harmonic) that was used to determine N, to compute the table appearing on the side cover of the synthesizer. This method of determining an initial value of N is also acceptable.

Due to design limitations inherent in the divider chain of the phase-locked loop, synthesizer frequency increments are limited to 80 kHz steps. It is therefore not always possible to derive the exact transmitter frequency. For this reason, F_x must be rounded to the nearest kHz, thereby introducing a frequency offset of up to a maximum of 40 kHz. It should be noted, however, that since the DEB AN/FRC-162 is specified to deliver normal performance over a capture range of plus or minus 0.005% of the operating frequency (plus or minus 400 kHz at 8.0 GHz and plus or minus 420 kHz at 8.4 GHz), synthesizer error should have no impact on radio performance when the TerraCom radio is used for reconstitution of a DEB I link.

3.0 OPERATING PROCEDURES

3.1 MAS Erection

Assembly and erection of the OE-308/U Mast Antenna Subsystem requires a trained six-man erection team. Detailed instructions are omitted from this manual to discourage inexperienced personnel from erecting the MAS and incurring subsequent hazard to personal safety. For instructions on erection of the MAS, the erection team should consult the Radiation Systems Incorporated instruction manual on the OE-308/U Antenna Group, a copy of which is stored in the equipment shelter. Information on heights, placement, and orientation of the MAS appears in Section 2. for the applicable sites.

If radio options 2 or 4 (radio RF heads remoted) is selected (See Paragraph 1.2.1.1.1(j).), the erection process must be conducted in stages. After completion of assembly and erection of the first section, including the launcher, work platforms, antenna mounting platform, and antenna assembly, the erection process is interrupted and applicable steps preparatory to operation of the microwave radio are taken, as are discussed in Section 3.2.4. After completion of the radio start-up procedures and check-out of the antenna pointing system, the MAS erection process can be completed.

> NOTE: Because the MAS is unclimbable, an operational test of the antenna pointing system must always be conducted prior to erection beyond the first mast section.

Radio options 1 and 3 require that rectangular waveguide sections be assembled during the MAS erection process. To prevent moisture from collecting in the waveguide from condensation, it is imperative that the waveguide be continually pressurized with dry air. An automatic dehydrator/pressurization system is provided, mounted in the shelter adjacent to (to the right of) the baseband/T1 patch bay for this purpose. As a backup, a manual handpump dehydrator is also provided. It is stored in a special mount above the baseband/T1 patch panels. Spare dessicant for the manual dehydrator is located in a storage drawer below one of the TSEC/CY-104A multiplexers.

> NOTE: In order for waveguide pressure to be maintained when the waveguide is assembled, a clean rubber o-ring gasket (provided with the MAS) must be installed at every waveguide connection between the shelter wall and the antennas. If a gasket is omitted, the system will not hold pressure and, because the mast cannot be climbed, it may become necessary to take it down to locate the leak

and install the missing or defective o-ring. The o-rings should be individually inspected to make certain that they are clean and undamaged and, if possible, they should be provided with a thin coat of silicon grease.

The dehydrator is activated by means of a circuit breaker, marked accordingly, located in the shelter primary power braker panel. The reserve tank pressure meter (located on the reserve tank) should read between 45 and 65 psi. The low pressure manifold, mounted on the shelter wall above the baseband/T1 patch panels, has a meter to read waveguide pressure. This meter should read between 1.5 and 4.5 psi. (See the appropriate Andrew bulletins in the shelter library, if adjustments to either the reserve tank or waveguide pressure is required, to adjust to within the quoted pressures.)

3.2 Type I (AN/GSC-48)

3.2.1 Primary Power

3.2.1.1 Shelter. Primary power control panels are located above the CY-104As, adjacent to the shelter entrance door. Voltmeters are included to monitor each phase of the incoming power. Over and under voltage conditions are monitored by circuitry in a junction box mounted between the voltmeters and the main circuit breaker panel. If the incoming voltage on any phase exceeds preset limits, a relay will energize, disconnecting power to the main circuit breaker. Indicator lights show either normal or over/under voltage conditions. An audible alarm is also provided, which can be disabled by the ALARM toggle switch. If an over or under voltage condition exists, the relay will latch until the power is removed from the shelter and the discrepancy corrected.

Before making connection to the shelter at the primary power entry panel, all circuit breakers should be in the off position. After power is applied to the shelter and proper voltages confirmed, the main breaker may then be thrown. Three indicator lights, located on the main breaker panel, should light to show that each phase is connected to the equipment circuit breaker panel.

A heavy wire (white insulation) is provided on a shelter cable reel to make connection to the generator ground. In addition to the power cables mounted on the generator fenders, a spare 50 foot power cable is also provided. This cable can be used to extend the maximum allowable distance to the generator or to connect to the site building when commercial or site power is active.

The equipment circuit breaker panel contains breakers for each primary power circuit in the shelter. Each breaker has an indicator light to show when the labeled circuit is live. The top row of lights apply to the top row of circuit breakers and the bottom row of lights indicate status of the bottom row of breakers. When it has been determined which equipments are required for a particular reconstitution scenario, and primary power connection to the shelter has been successfully concluded, appropriate breakers may then be energized as a preliminary to start-up procedure for each piece of equipment, discussed in following paragraphs.

NOTE: The Hewlett Packard 3550B Test Set, contained in the shelter, is transportable and operates on batteries. A built-in AC power supply is provided for charging the batteries during normal operation inside the equipment shelter. To activate the charging circuits, the test set must be connected to an AC source via the front panel connector and the set must be turned ON. (During transit, the AC power cable is stored inside the test set's front panel cover.) If the test set is operated on internal batteries alone, without periodic recharging, permanent damage to the batteries may result.

3.2.1.2 Generator. The following steps are required to initiate operation of the PU-405 A/M primary power generator:

(1) Preparation for starting:

WARNING: The generator set must be grounded to avoid shock hazard. Connect a ground cable to the terminal stud, located on the skid base of the generator.

(a) Open the cover on the instrument control panel and the engine side panels.

(b) Close all panels and doors on the generator end of the set, except the electrical compartment air intake. This compartment must be kept open to prevent overheating of electrical components.

(c) Depending on the ambient temperature, open or close the engine compartment doors.

NOTE: In extreme cold weather (below 0 degrees F), the engine panel doors should initially be kept

closed to help warm the engine (normal water gage operating temperature is 180 degrees).

(d) Check the engine radiator shutter with the manual shutter lever for freedom of movement.

(e) Check the emergency shutdown handle to be sure it is all the way in and locked.

(f) Place the control switches in the following positions:

-Winterization heater, ON-OFF switch to OFF position.

-UNIT-PARALLEL switch to UNIT position.

-Governor ON-OFF switch to OFF position.

-AM/VM (ammeter/voltmeter) selector switch to desired position.

-Circuit breakers AC and DC to OFF position.

-50-60 CPS switch to 60 CPS position.

(2) Starting:

NOTE: When the fuel pumps are energized, the fuel system will bleed itself.

(a) Perform "preparation for starting" steps (as in (1), above).

(b) Set the FUEL SELECTOR for proper fuel supply (AUX or SET tank).

(c) Push and release OVERSPEED GOVERNOR reset button.

CAUTION: Do not operate the starter for more than 30 seconds without pausing, to let it cool for at least 2 minutes.

(d) Place the ENGINE RUN switch to the RUN position.

(e) Place the THROTTLE CONTROL approximately in midposition.

(f) Press the START switch up and hold until the engine starts; then, release the switch.

(g) Press the FIELD FLASH switch up and release it when the voltage rises.

(h) Place the GOVERNOR switch to the ON position.

(i) Allow the engine to warm up for 5 minutes.

(j) Turn the FREQUENCY CONTROL clockwise, to raise the frequency to the desired level.

(k) Turn the VOLTAGE CONTROL clockwise, to raise the voltage to the desired level.

(l) Apply the AC load by moving the AC circuit breaker to the ON position.

(m) Readjust the VOLTAGE CONTROL and the FREQUENCY CONTROL, if necessary.

(3) Stopping:

NOTE: When the engine is hot, allow it to idle, with no load, for 5 minutes prior to stopping.

(a) Move the AC circuit breaker switch to the OFF position.

(b) Place the THROTTLE CONTROL approximately in midposition.

(c) Place the GOVERNOR switch to the OFF position.

(d) Turn the VOLTAGE CONTROL and the FREQUENCY CONTROL fully counterclockwise.

(e) Move the ENGINE RUN switch to the STOP position.

(4) Emergency shutdown:

(a) Move all circuit breakers to the OFF position.

(b) Turn the THROTTLE SHUTDOWN handle counterclockwise and pull out.

NOTE: For operation in extreme cold (below 0 degrees F), see the PU-405 maintenance Manual, page 27.

(5) Parallel operation. Instructions for parallel operation of the generators are shown on a metal plate fastened to the switch box assembly. The instructions are repeated here, for reference only.

Switch box assembly plate:

A. Prior to operation, read instruction manual furnished with the power unit (generator set).

B. To operate one unit, this procedure should be followed:

1. Connect all necessary cables to generator and switch box assembly.

2. Bring generator up to rated spe voltage and frequency.

3. Close generator circuit breaker.

4. Move switch box synchronizing switch, corresponding to generator used, to "ON" position.

5. Press adjacent bypass switch.

6. Generator now supplies power thru switch box output terminals.

C. To operate two units in parallel, this procedure should be followed:

1. Connect all necessary cables to generator and switch box assembly.

2. Bring first generator up as accomplished in Section B.

3. Bring second generator up to rated speed, voltage and frequency.

4. Move paralleling operation switch, on each generator, to "ON" position.

5. Close circuit breakers on second generator.

6. Move switch box synchronizing switch corresponding to second generator, to "ON" position.

7. The two generators should now be in parallel operation. (In the event that the generators do not parallel, slight adjustment of frequency may be necessary on the incoming generator.)

D. To stop operation of unit(s), this procedure should be followed:

1. Open circuit breaker on generator(s) to be stopped.

2. Move switch box synchronizing switch, corresponding to generator(s) to "OFF" position.

3.2.2 TSEC/CY-104A

Prior to operation of each CY-104A, the front covers (doors) of the HY-12A should be opened and each plug-in card be pressed in, to make certain that the card is properly seated in its PC card connector. (It is possible for the cards to work out of the connectors during transit, even though pressure is maintained by retainer strips on the door.)

The following steps are required to initiate operation of the TSEC/CY-104A:

(1) Assure that the KG-34 permuters are set properly.

(2) Set the NRZ/BIPOLAR switch on the HN-74 receive unit to BIPOLAR.

NOTE: A cable has been installed in each CY-104A, connecting the NRZ output to the NRZ input, so that when the NRZ/BIPOLAR switch is in the NRZ position, the CY-104A is looped back. This was done to assist in trouble shooting.

(3) Set the KEEP ALIVE/INJ switch on the HN-74 to KEEP ALIVE.

(4) Set the MAN/AUTO switch on the HN-74 alarm unit to the AUTO position.

NOTE: When operating in the MAN position, the KG-34 XMTR PREP button must be pushed, to achieve system synchronization.

(5) Set the HN-74 POWER switch to ON.

(6) Set the KG-34 POWER switch to ON.

NOTE: Should the KG-34 go into an alarm condition (indicated by the illumination of the red ALARM light and an audible alarm), press the RESET button to clear the alarm.

(7) Push the RESET button on the HN-74 power supply if the green RESTART ALARM light is on. This will extinguish the light and cause system synchronization.

(8) Push the FRAME button on the HY-12 power and alarm unit to extinguish the FRAME light.

When all alarm indications are off and the white KG-34 XMTR OPER and RCVR OPER lights are on, the system is ready for traffic.

3.2.3 AN/FCC-97

The FCC-97s are turned on by appropriately marked circuit breakers, located in the primary power control panel above the CY-104As. Prior to operation, the front panel covers should be removed and each plug-in unit should be checked to make certain it is properly seated in its PC card connector. (The front panel covers must be left off during operation.)

3.2.4 Microwave Radio

The following paragraphs describe start-up procedures for the TerraCom radio. Radio operation for each configuration option (as described in Paragraph 1.2.1.1.1(j)) is individually described. When two radios are to be used, each step should be performed on both, in parallel. Circulator connections for options 2 and 4 will be as follows:

Port #1	Transmitter (or TWT)
Port #2	Antenna
Port #3	Receiver

3.2.4.1 Option 1. In this configuration, receiver and transmitter RF modules are installed in their respective assemblies in the equipment shelter. Transmitter RF output power is 0.5 watt.

3.2.4.1(a) Transmitter. The following steps are required to initiate operation of the TCM-604B Transmitter:

(1) Set the transmitter RF power switch to 0.5 W. (See Figure 57.)

(2) Set the variable amplitude equalizer U-links (located in the baseband module) to the "zero feet" positions (E2 to E14 and E13 to E15).

(3) Make certain that the transmitter inputs are correctly patched (both baseband and audio). Baseband input level is 1 volt peak-to-peak. (Baseband attenuator should be set at 5 dB.) Audio input level is -5 dBm. (Audio attenuator should be set to 0 dB.)

(4) Set digital frequency synthesizer thumbwheel switches to the proper link frequency. Switches are located inside the synthesizer module.

(5) Turn the power supply circuit breaker to ON. The Power Supply ON lamp should illuminate and the power supply FAULT lamp should be off. The synthesizer fault lamp should extinguish within five seconds. The AFC FAULT lamp may not extinguish until transmitter tuning has been performed.

(6) With the DEVIATION TEST switch ON, check the following control monitor meter readings (The FAULT lamp on the control monitor will be illuminated while the DEVIATION TEST switch is on.):

PARAMETER	METER ZONE
+15 VDC	Green
-15 VDC	Green
-28 VDC	Green
XMTR Power	Black
Synth	Blue
Carrier Dev	Blue*
AFC ERR	Black**
Ch 1 Carr	Blue***
Ch 1 Dev	Blue***
Ch 2 Carr	Not Used
Ch 2 Dev	Not Used

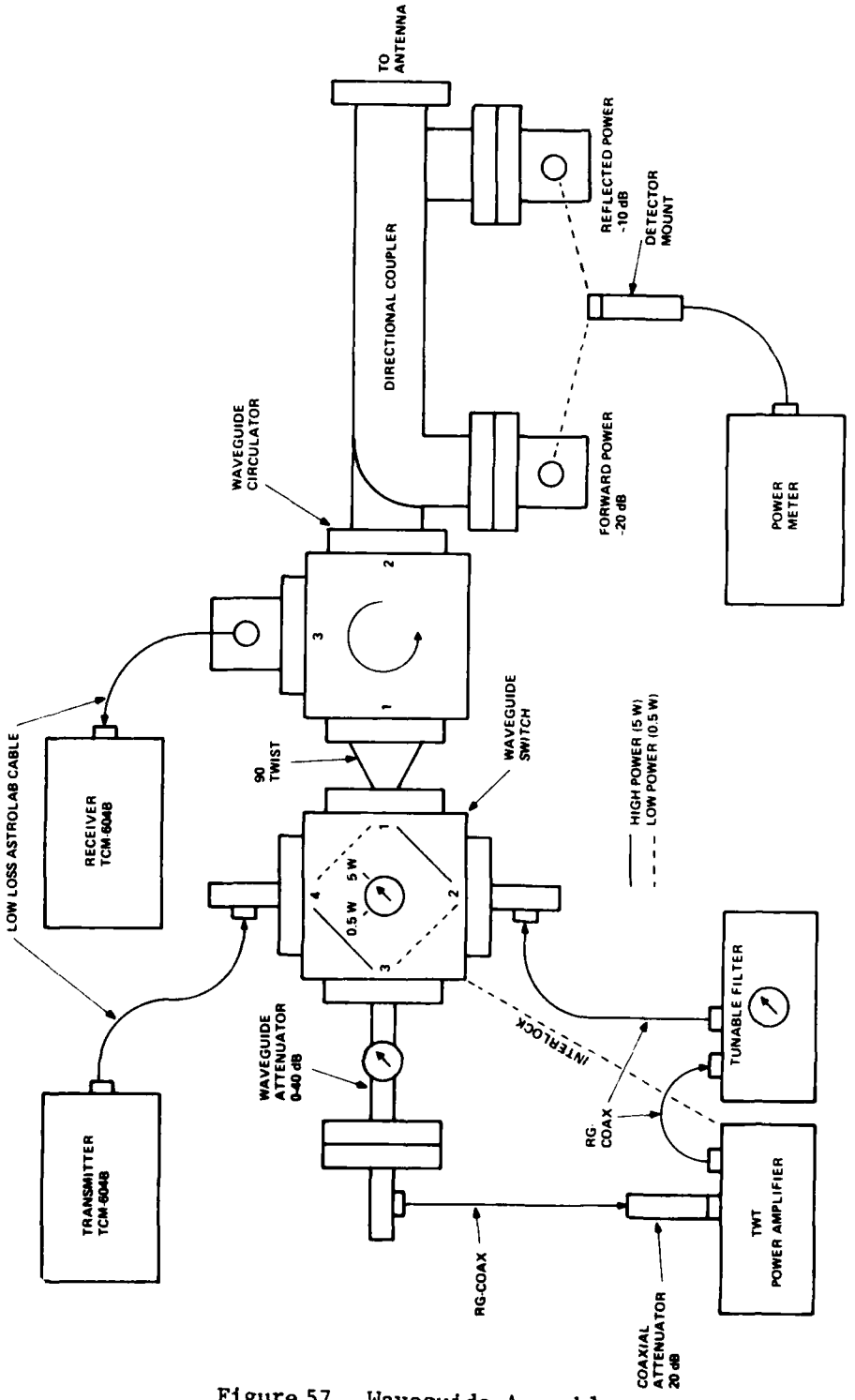


Figure 57. Waveguide Assembly

* Reading is present only when baseband input is applied or when the test tone switch on the baseband module is at BB. Carrier deviation may be checked initially using the test tone. When baseband input is present, the BB test tone should be off and the baseband attenuator control set to produce the proper deviation meter reading.

** AFC Error may read outside the black zone if the transmitter is detuned. After performing the transmitter tuning procedure, assure that the correct reading is attained.

*** Reading is present only when audio 1 input is applied or when the test tone (TT SEL) switch is in the AUD 1 position. Levels may be checked initially using the test tone. When Audio 1 input is present, the audio test tone should be off and the audio channel attenuator set to produce the proper Ch 1 Deviation meter reading.

(7) Turn the DEVIATION TEST switch to OFF.

(8) Switch the AFC switch on the AFC Module to DISABLE. (The fault lamps on the AFC module and control monitor module should illuminate.)

(9) Tune the direct reading frequency indicator to the desired transmitter frequency. Watching the front panel AFC meter on the AFC module, adjust the frequency for a zero center indication.

(10) Switch the AFC switch to the ENABLE position. (All fault lamps should be off.)

(11) Set the power meter (Narda Model 8400) range switch to "X 10".

(12) Connect power meter detector thru a 10 dB coaxial attenuator to the FOREWARD POWER port on the waveguide directional coupler. (See Figure 57.) Correct to watts by multiplying by 1000 (+30 dB), and record the reading.

(13) Connect the power meter detector to the REVERSE POWER port of the waveguide directional coupler. Correct the reading to milliwatts by multiplying by 10 (+10 dB), and record the measurement.

(14) Compare the reverse and forward power measurements to obtain VSWR from the graph in Figure 58. VSWR should not exceed 1.2.

3.2.4.1(b) Receiver. The following steps are required to initiate operation of the TCM-604B receiver.

(1) Assure that the receiver outputs are correctly patched (both baseband and audio Ch 1).

(2) Adjust the baseband attenuator to the 0 dB position (output level: 1 volt peak-to-peak). Adjust audio Ch 1 attenuator to the 5 dB position (output level: -5 dBm).

(3) Turn the power supply circuit breaker to ON.

(4) Check the following control/monitor and RF module meter readings:

PARAMETER	METER ZONE
+15 V	Green
-15 V	Green
-28 V	Green

(5) Switch the AFC switch located on the AFC module to DISABLE. (The AFC FAULT lamp and the control/monitor alarm lamp will be illuminated while the AFC switch is in the DISABLE position.)

(6) Tune the preselector filter to the incoming carrier frequency. (The direct reading dial is accurate to within plus or minus 2 MHz.)

(7) Set the control/monitor meter select switch to the THRESHOLD position.

(8) Tune the local oscillator to the proper link frequency. As the proper frequency is approached, a reading will be attained on the THRESHOLD meter. When the THRESHOLD level approaches center scale, switch the meter to read SIGNAL STRENGTH. Tune the local oscillator to peak the signal strength level. Do not retune the (broadband) preselector filter; dial accuracy is sufficient to result in the proper setting.

(9) While observing the AFC meter on the AFC module, tune the local oscillator slightly above and below the point where peak

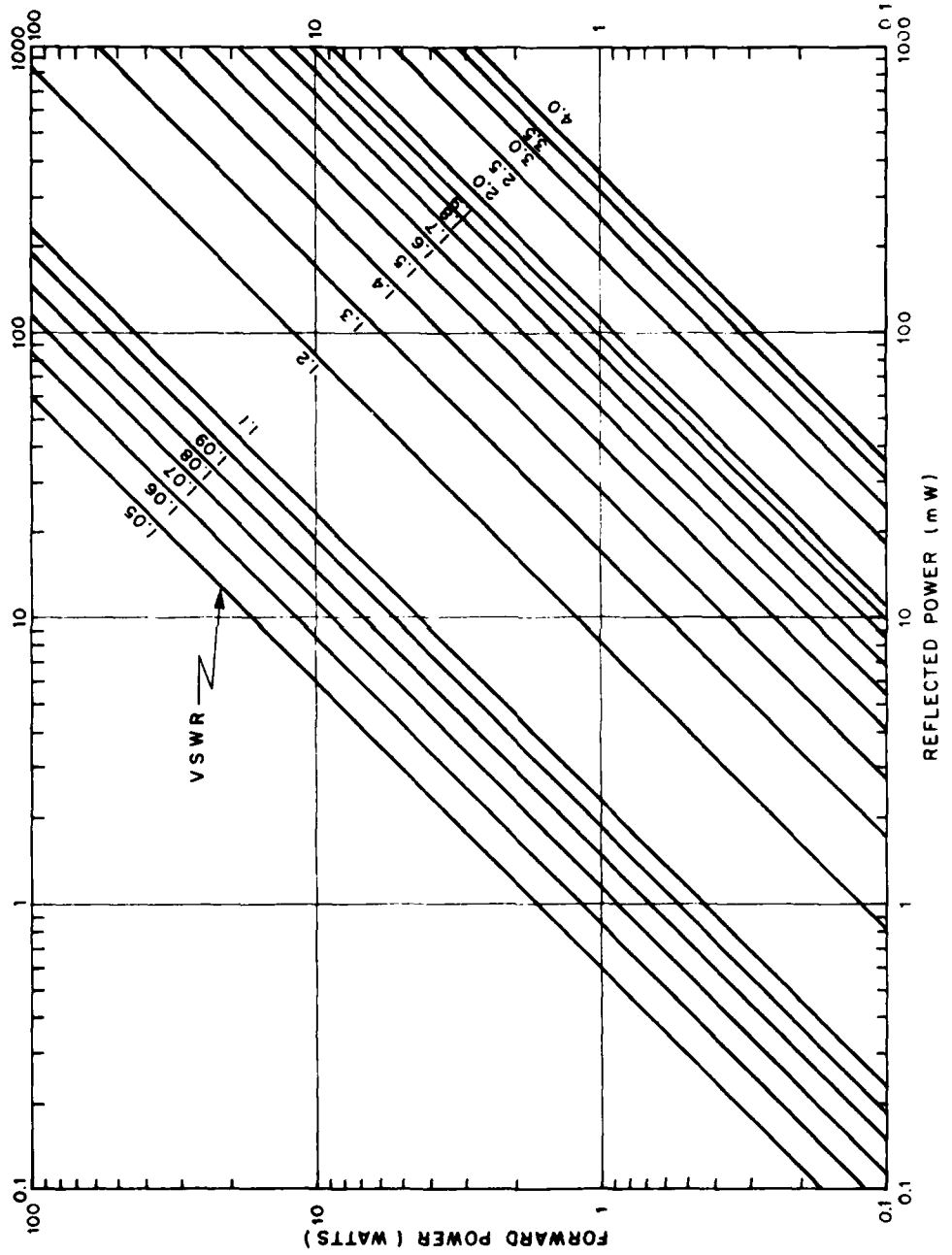


Figure 58. VSWR Graph

signal strength was attained. The AFC meter reading must swing equal distances above and below center scale as the local oscillator is tuned. (If the swings are not equal, the local oscillator is tuned to a side band of the incoming signal. Tune the local oscillator a small amount in each direction until equal AFC swings are observed.) Then, center the AFC meter readings between the swings (center scale).

(10) Switch the AFC to the ENABLE position. All fault lamps should extinguish.

(11) Turn the control/monitor meter to the AFC ERR position. Tune the local oscillator for a zero center scale AFC error reading.

(12) Check the following control/monitor meter readings:

PARAMETER	METER ZONE
Signal Strength	Black
Threshold	Blue
Demod	Blue
IF Output	Blue
Carrier Dev	Blue*
AFC ERR	Green
Ch 1 Dev	Blue**
Ch 2 Dev	Not Used

* Baseband modulation must be present.

** Channel 1 modulation must be present.

3.2.4.2 Option 2. In this configuration, the receive and transmit RF modules are installed in remote enclosures on the antenna platform. Transmitter output power is nominally 0.5 watt.

NOTE: Directions for "remoting" and "remote operation" of the TCM-604B radio are treated separately, in the following paragraphs. It is important to note that the transmitter is initially used as a signal source for receiver tuning. Subsequent procedures call for retuning the transmitter to the proper transmitter frequency, prior to MAS erection.

3.2.4.2(a) Transmitter Remoting. The following steps are required to configure the transmitter for remote operation.

Warning: DO NOT ATTEMPT TO EXTRACT THE RF MODULE BEFORE REMOVING THE RF CONNECTOR (Steps 2 and 3, below).

(1) Position the transmitter meter select switch to TRANSIT.

(2) Remove the coaxial cable from the RF connector, located on the right side of the transmitter cabinet.

(3) Remove four Phillips head screws from the RF connector and unscrew (CCW) the RF connector.

(4) Remove the RF module from the transmitter cabinet.

(5) Remove the remote enclosures from their storage positions, adjacent to the radios.

(6) Place the remote enclosure meter select switches to the TRANSIT position.

(7) Inspect the remote enclosure to make certain that the 100 MHz limiter-driver amplifier is installed (located on the front panel under a removable cover). Transmitter and receiver remote enclosures are identical, except that only the transmitter uses that amplifier.

(8) Remove the remote kit replacement panel and its attached wire harness assembly from the storage location beneath the T1 patch panel. (This panel will replace the RF module in the transmitter cabinet.)

(9) Connect the wire harness assembly Cannon connector into its mate at the rear of the transmitter cabinet.

(10) Install the remote kit replacement panel in the transmitter cabinet.

(11) Attach the remoting cable to the Bendix connector on the front of the replacement panel.

(12) Remove the baseband module from the transmitter cabinet and set the variable amplitude equalizer U-links to positions corresponding to the necessary cable length between the transmitter and remote RF head. Reinstall the baseband module.

(13) Insert the RF module into the remote enclosure.

(14) Install the RF connector (previously mounted in the transmitter cabinet) in the side of the remote enclosure. After the RF connector has been screwed into the RF module receptacle, align the gasket and connector holes with the holes in the enclosure by backing off slightly from the tightest position. Install the four Phillips head screws in the RF connector.

(15) Remove the synthesizer module and set the thumbwheel switches to the proper link receive frequency. (Switches are located inside the synthesizer module.) Reinstall the synthesizer module.

(16) Install the transmitter remote enclosure. (Instructions for installation with the MAS are contained in the MAS manual. The MAS should be erected to the first section only, to allow access to the transmitter and receiver RF modules for tuning purposes.)

Note: DO NOT CONNECT AC POWER TO THE SOLID STATE AMPLIFIER UNTIL AN RF LOAD IS APPLIED.

(17) Connect the transmitter RF output to port number 1 on the coaxial circulator through two 30 dB coaxial attenuators (60 dB total).

(18) Connect the remoting cable between the equipment shelter RF entry panel and the transmitter remote enclosure.

3.2.4.2(b) Receiver Remoting. The following steps are required to configure the receiver for remote operation.

Warning: DO NOT ATTEMPT TO EXTRACT THE RF MODULE BEFORE REMOVING THE RF CONNECTOR (Steps 2 and 3, below).

(1) Position the receiver meter select switch to TRANSIT.

(2) Remove the coaxial cable from the RF connector, located on the right side of the receiver cabinet.

(3) Remove four Phillips head screws from the RF connector and unscrew (CCW) the RF connector.

(4) Remove the RF module from the receiver cabinet.

(5) Inspect the remote enclosure to make certain that a 100 MHz limiter-driver amplifier is not included (located on the front panel under a removable cover on the transmitter remote enclosure only). Transmitter and receiver remote enclosures are identical except that only the transmitter uses that amplifier.

(6) Remove the remote kit replacement panel and its attached wire harness assembly from the storage location beneath the T1 patch panel. (This panel will replace the RF module in the receiver cabinet.)

(7) Connect the wire harness assembly Cannon connector to its mate at the rear of the receiver cabinet.

(8) Install the remote kit replacement panel in the receiver cabinet.

(9) Connect a handset to the jack in the replacement enclosure.

(10) Attach the remoting cable to the Bendix connector on the front of the replacement panel.

(11) Insert the RF module into the remote enclosure.

(12) Install the RF connector (previously mounted in the receiver cabinet) in the side of the remote enclosure. After the RF connector has been screwed into the RF module receptacle, align the gasket and connector holes with the holes in the enclosure by backing off slightly from the tightest position. Install the four Phillips head screws in the RF connector.

(13) Install the receiver remote enclosure. (Instructions for remote enclosure installation can be found in the MAS manual. The MAS should be erected to the first section only, to allow access to the receiver and transmitter RF modules, for tuning purposes.)

(14) Connect the receiver RF input to port number 3 on the circulator.

(15) Connect circulator port number 2 to the antenna.

(16) Connect the remoting cable between the equipment shelter RF entry panel and the receiver remote enclosure.

(17) Connect a handset to the receiver remote enclosure.

3.2.4.2(c) Transmitter Operation. The following steps are necessary to initiate operation of the TCM-604B transmitter.

NOTE: If two transmitters are to be used, the following instructions should be repeated, step-for-step, alternately for each transmitter.

(1) Turn the power supply circuit breaker to ON. The power supply ON lamp should illuminate and the power supply FAULT lamp should be off. The synthesizer fault lamp should extinguish within five seconds. The AFC FAULT lamp may not extinguish until transmitter tuning has been performed.

(2) With the DEVIATION TEST switch ON, check the following control monitor meter readings (The FAULT lamp on the control monitor will be illuminated while the DEVIATION TEST switch is on.):

PARAMETER	METER ZONE
+15 VDC	Green
-15 VDC	Green
-28 VDC	Green
Xmtr Power	Black
Synth	Blue
Carrier Dev	Blue*
AFC ERR	Black**
Ch 1 Carr	Blue***
Ch 1 Dev	Blue***
Ch 2 Carr	Not Used
Ch 2 Dev	Not Used

* Reading is present only when baseband input is applied or when the test tone switch on the baseband module is at BB. Carrier deviation may be checked initially using the test tone. When baseband input is present, the BB test tone should be off and the baseband attenuator control set to produce the proper deviation meter reading.

** AFC Error may read outside the black zone if the transmitter is detuned. After performing the transmitter tuning procedure, assure that the correct reading is attained.

*** Reading is present only when the audio 1 input is applied or when the test tone switch is at AUD 1. Levels

may be checked initially, using the test tone. When the audio 1 input is present, the audio test tone should be off and the audio Channel 1 attenuator set to produce the proper Ch 1 Deviation meter reading.

(3) Return the control monitor switch to the TRANSIT position.

(4) Turn the DEVIATION TEST switch to OFF.

(5) Check the following remote enclosure meter readings:

PARAMETER	METER ZONE
-15 V	Green
+15 V	Green
+28 V	Green
AFC ERR	Black*
SYNTH	Blue

* AFC Error may read outside the black zone if the transmitter is detuned. After performing Steps (7) and (8), assure that the correct reading is attained.

(6) Switch the AFC switch on the AFC module to DISABLE. (The fault lamps on the AFC module and control monitor module should illuminate.)

(7) Tune the RF module direct reading frequency indicator to the receive frequency (This prepares for an RF loop.). Adjust the frequency for zero center indication on the AFC meter. (This will require coordination between the individual tuning the transmitter at the antenna and a second individual, observing the meter in the shelter.)

(8) Switch the AFC switch to the ENABLE position. (All fault lamps should be off.)

3.2.4.2(d) Receiver Operation. Because the receiver RF head is remoted at the top of an unclimbable tower (MAS) in this configuration (Option 2), receiver tuning must be performed before the RF head is raised to an inaccessible height. This is required because the receiver does not use a crystal-controlled local oscillator; it employs a tracking AFC circuit which locks onto the received signal. The following steps are required to pretune and initiate operation of the TCM-604B receiver.

NOTE: If two receivers are to be used, the following instructions should be repeated, step-for-step, alternately for each receiver.

(1) Turn the power supply circuit breaker to ON. The power supply ON lamp should illuminate and the power supply FAULT lamp should be off.

(2) Check the following control monitor meter readings:

PARAMETER	METER ZONE
+15 V	Green
-15 V	Green
-28 V	Green

(3) Return the control monitor switch to the TRANSIT position.

(4) Also, check the above readings on the remote RF module meter. (Note that the remote enclosure meter selector switch must be left in the TRANSIT position when the meter is not in use.)

(5) Switch the AFC switch located on the AFC module to DISABLE. (The AFC FAULT lamp and the control/monitor alarm lamp will be illuminated while the AFC switch is in the DISABLE position).

(6) Tune the preselector filter to the proper receive carrier frequency. (The direct reading dial is accurate to within plus or minus 2 MHz.)

(7) Set the control/monitor meter select switch to the THRESHOLD position.

(8) Tune the local oscillator to the proper link frequency. As the proper frequency is approached, a reading will be attained on the THRESHOLD meter. When the THRESHOLD level approaches center scale, switch the meter to read SIGNAL STRENGTH. Tune the local oscillator to peak the signal strength level. Do not retune the (broadband) preselector filter; dial accuracy is sufficient to result in the proper setting.

(9) While observing the AFC meter on the AFC module, tune the local oscillator slightly above and below the point where peak signal strength was attained. (This will require coordination between the individual tuning the local oscillator at the

remote enclosure and a second individual observing the AFC meter reading in the shelter.) The AFC meter reading must swing equal distances above and below center scale as the local oscillator is tuned. If the swings are not equal, the local oscillator is tuned to a side band of the incoming signal. Tune the local oscillator a small amount in each direction until equal AFC swings are observed. Then, center the AFC meter readings between the swings (center scale).

(10) Switch the AFC switch to the ENABLE position. All fault lamps should go out. The receiver will lock onto the received signal.

(11) Turn the remote enclosure meter select switch to the AFC ERR position. Tune the local oscillator for a zero center scale AFC error reading.

(12) Place the meter select switch to the TRANSIT position.

(13) Check the following control/monitor meter readings:

PARAMETER	METER ZONE
Signal Strength	Black
Threshold	Blue
Demod	Blue
IF Output	Blue
Carrier Dev	Blue*
AFC ERR	Green
Ch 1 Dev	Blue**
Ch 2 Dev	Not Used

* Baseband modulation must be present.

** Channel 1 modulation must be present.

(14) Close and secure the cover on the receiver remote enclosure.

(15) Place the power supply circuit breaker on the transmitter to its OFF position.

(16) Remove the two 30 dB coaxial attenuators between the transmitter RF output and the circulator. Connect the transmitter RF output directly to the circulator.

(17) Remove the synthesizer module and set the thumbwheel switches to the proper transmit frequency for the link being restored. Reinstall the synthesizer module.

(18) Turn the power supply circuit breaker to ON.

(19) Switch the AFC switch to its DISABLE position.

(20) Tune the RF module direct reading frequency indicator to the transmit frequency. Adjust the frequency for zero center indication on the AFC meter.

(21) Switch the AFC switch to the ENABLE position. (All fault lamps should be off.)

(22) Place the meter select switch for the transmitter remote enclosure to the TRANSIT position.

(23) Close and secure the cover on the transmitter remote enclosures.

(24) Proceed with MAS erection.

(25) Align the antenna(s). (See Section 3.2.5.)

3.2.4.3 Option 3. In this configuration, the receive and transmit RF modules (heads) are left installed in their respective assemblies in the equipment shelter. Transmitter RF output power is 5 watts.

3.2.4.3(a) Transmitter. The following steps are required to initiate operation of the TCM-604B transmitter.

(1) Set the transmitter waveguide switch to 5 watts. (See Figure 57, page 161.) The TWT power amplifier is interlocked with the waveguide switch to prevent operation of the TWT when the waveguide switch is in the 0.5 watt position.

(2) Turn the waveguide RF attenuator to maximum attenuation (full CCW).

(3) Set the variable amplitude equalizer U-links (located in the baseband module) to the "zero feet" positions (E2 to E14 and E13 to E15).

(4) Make certain that the transmitter inputs are correctly patched (both baseband and audio). Baseband input level is 1 volt peak-to-peak. (Baseband attenuator should be set at 5

dB.) Audio input level is -5 dBm. (Audio attenuator should be set to 0 dB.)

(5) Set the digital frequency synthesizer thumbwheel switches to the proper link frequency. Switches are located inside the synthesizer module.

(6) Turn the power supply circuit breaker to ON. The power supply ON lamp should illuminate and the power supply FAULT lamp should be off. The synthesizer fault lamp should extinguish within five seconds. The AFC FAULT lamp may not extinguish until transmitter tuning has been performed .

(7) With the DEVIATION TEST switch ON, check the following control monitor meter readings (The FAULT lamp on the control monitor will be illuminated while the DEVIATION TEST switch is on.):

PARAMETER	METER ZONE
+15 VDC	Green
-15 VDC	Green
-28 VDC	Green
XMTR Power	Black
Synth	Blue
Carrier Dev	Blue*
AFC ERR	Black**
Ch 1 Carr	Blue***
Ch 1 Dev	Blue***
Ch 2 Carr	Not Used
Ch 2 Dev	Not Used

* Reading is present only when the baseband input is applied or when the test tone switch on the baseband module is at BB. Carrier deviation may be checked initially using the test tone. When baseband input is present, the BB test tone should be off and the baseband attenuator control set to produce the proper deviation meter reading.

** AFC Error may read outside the black zone if the transmitter is detuned. After performing the transmitter tuning procedure, assure that the correct reading is attained.

*** Reading is present only when the audio 1 input is applied or when the test tone (TT SEL) switch is in the AUD 1 position. Levels may be checked initially using the

test tone. When Audio 1 input is present, the audio test tone should be off and the audio channel attenuator set to produce the proper Ch 1 Deviation meter reading.

(8) Turn the DEVIATION TEST switch OFF.

(9) Switch the AFC switch on the AFC module to DISABLE. (The fault lamps on the AFC module and control monitor module should illuminate.)

(10) Tune the direct reading frequency indicator to the desired transmitter frequency. Watching the front panel AFC meter on the AFC module, adjust the frequency for a zero center indication.

(11) Switch the AFC switch to the ENABLE position. (All fault lamps should be off.)

3.2.4.3(b) Power Amplifier. The following steps are required to prepare for operation of the TWT power amplifier:

(1) Turn the waveguide attenuator to its maximum attenuation position (full CCW).

(2) Adjust preselector filter TCM-6TPR to the proper transmitter frequency.

(3) Connect the power meter (Narda Model 8400) thru a 20 dB coaxial attenuator detector to the FOREWARD POWER port on the waveguide directional coupler. (See Figure 57, page 161.)

(4) Place the power meter RANGE SWITCH to the "X 10" scale.

The following steps are required to initiate operation of the TWT power amplifier:

NOTE: Before the unit can be completely energized, the RF output must be connected, to activate the RF interlock.

(1) Push the POWER switch on and allow approximately three minutes for the traveling-wave tube to warm up. The POWER ON lamp should be lighted; if not, check the rear panel fuse or the main line cord. The instrument has an automatic timer that prevents application of high voltage to the traveling-wave tube before the warmup period is complete. Upon completion of warmup, the RF READY lamp will light and will enable high

voltage to be applied to the traveling-wave tube. Should the RF READY lamp not light after the proper warmup time, check the RF interlock connection, to insure proper operation.

(2) Push the RF switch on. You should see a low level of current on the front panel helix current meter. This level may increase when RF drive is applied to the amplifier. Should the instrument be overdriven by the RF source, the helix protect circuitry will activate and switch the unit to standby; the RF and READY lamps will go out. Therefore, the best operating procedure is to have the RF source at a very low level at initial turn-on (Paragraphs 3.2.4.3(a)(2) and 3.2.4.3(b)(1)).

(3) Adjust the waveguide attenuator for a reading of 0.5 milliwatt on the power meter. Correct to watts by multiplying by 10,000 (+40 dB) and record the reading.

(4) Connect the power meter detector thru a 10 dB coaxial attenuator to the REVERSE POWER port of the wavequide directional coupler. Correct to milliwatts by multiplying by 100 (+20 dB) and record the reading.

(5) Compare the reverse and forward power measurements to obtain VSWR from the graph in Figure 58, page 164. VSWR should not exceed 1.2.

3.2.4.3(c) Receiver. The following steps are required to initiate operation of the TCM-604B receiver.

(1) Assure that the receiver outputs are correctly patched (both baseband and audio Ch 1).

(2) Adjust the baseband attenuator to the 0 dB position (output level: 1 volt peak-to-peak). Adjust the audio Ch 1 attenuator to the 5 dB position (output level: -5 dBm).

(3) Turn the power supply circuit breaker ON.

(4) Check the following control/monitor and RF module meter readings:

PARAMETER	METER ZONE
+15 V	Green
-15 V	Green
-28 V	Green

(5) Switch the AFC switch, located on the AFC module, to DISABLE. (The AFC FAULT lamp and the control/monitor alarm lamp will be illuminated while the AFC switch is in the DISABLE position.)

(6) Tune the preselector filter to the incoming carrier frequency. (The direct reading dial is accurate to within plus or minus 2 MHz.)

(7) Set the control/monitor meter select switch to the THRESHOLD position.

(8) Tune the local oscillator to the proper link frequency. As the proper frequency is approached, a reading will be attained on the THRESHOLD meter. When the THRESHOLD level approaches center scale, switch the meter to read SIGNAL STRENGTH. Tune the local oscillator to peak the signal strength level. Do not retune the (broadband) preselector filter; dial accuracy is sufficient to result in the proper setting.

(9) While observing the AFC meter on the AFC module, tune the local oscillator slightly above and below the point where peak signal strength was attained. The AFC meter reading must swing equal distances above and below center scale as the local oscillator is tuned. If the swings are not equal, the local oscillator is tuned to a side band of the incoming signal. Tune the local oscillator a small amount in each direction until equal AFC swings are observed. Then, center the AFC meter readings between the swings (center scale).

(10) Switch the AFC to the ENABLE position. All fault lamps should extinguish.

(11) Turn the cont-- 'monitor meter to the AFC ERR position. Tune the local osci .or for a zero center scale AFC error reading.

(12) Check the following control/monitor meter readings:

PARAMETER	METER ZONE
Signal Strength	Black
Threshold	Blue
Demod	Blue
IF Output	Blue
Carrier Dev	Blue*
AFC ERR	Green
Ch 1 Dev	Blue**
Ch 2 Dev	Not Used

* Baseband modulation must be present.

** Channel 1 modulation must be present.

3.2.4.4 Option 4. In this configuration, the receive and transmit RF modules (heads) are located in remote enclosures, together with two-watt solid state amplifiers.

NOTE: Directions for "remoting" and "remote operation" of the TCM-604B radio are treated separately, in the following paragraphs. It is important to note that the transmitter is initially used as a signal source for receiver tuning. Subsequent procedures call for retuning the transmitter to the proper transmit frequency, prior to MAS erection.

3.2.4.4(a) Transmitter Remoting. The following steps are required to configure the transmitter for remote operation.

Warning: DO NOT ATTEMPT TO EXTRACT THE RF MODULE BEFORE REMOVING THE RF CONNECTOR (Steps 2 and 3, below).

(1) Position the transmitter meter select switch to TRANSIT.

(2) Remove the coaxial cable from the RF connector, located on the right side of the transmitter cabinet.

(3) Remove four Phillips head screws from the RF connector and unscrew (CCW) the RF connector.

(4) Remove the RF module from the transmitter cabinet.

(5) Remove the remote enclosures from their storage position, adjacent to the radios.

(6) Place the remote enclosure meter select switch to the TRANSIT position.

(7) Inspect the remote enclosure to make certain that the 100 MHz limiter-driver amplifier is installed (located on the front panel under a removable cover). The transmitter and receiver remote enclosures are identical, except that only the transmitter uses that amplifier.

(8) Remove the remote kit panel and its attached wire harness assembly from the storage location beneath the T1 patch panel. (This panel will replace the RF module in the transmitter cabinet.)

(9) Connect the wire harness assembly Cannon connector into its mate at the rear of the transmitter cabinet.

(10) Install the remote kit replacement panel in the transmitter cabinet.

(11) Attach the remote cable to the Bendix connector on the front of the replacement panel.

(12) Remove the baseband module from the transmitter cabinet and set the variable amplitude equalizer U-Links to positions corresponding to the necessary cable length between the transmitter and remote RF head. Reinstall the baseband module.

(13) Insert the RF module into the remote enclosure.

(14) Install the RF connector (previously mounted in the transmitter cabinet) in the side of the remote enclosure. Align the gasket and connector holes with the holes in the enclosure after the RF connector has been screwed into the RF module receptacle by backing off slightly from the tightest position. Install the four Phillips head screws in the RF connector.

(15) Install the solid state amplifier on the transmitter remote enclosure by replacing the enclosure cover with the cover containing the amplifier.

(17) Remove the synthesizer module and set the thumbwheel switches to the proper link receiver frequency. (Switches are located inside the synthesizer module.) Reinstall the synthesizer module.

(18) Install the transmitter remote enclosure. (Instructions for installation are contained in the MAS manual. The MAS should be erected to the first section only, to allow access to the transmitter and receiver RF modules for tuning purposes.)

Warning: DO NOT CONNECT AC POWER TO THE AMPLIFIER UNTIL ALL RF CONNECTIONS ARE MADE.

(19) Connect the transmitter RF output to port number 1 on the coaxial circulator through two 30 dB coaxial attenuators (60 dB total).

(19) Connect the remoting cable between the equipment shelter RF entrance panel and the transmitter remote enclosure.

3.2.4.4(b) Receiver Remoting. The following steps are required to configure the receiver for remote operation.

Warning: DO NOT ATTEMPT TO EXTRACT THE RF MODULE BEFORE REMOVING THE RF CONNECTOR (Steps 2 and 3, below).

(1) Position the receiver meter select switch to TRANSIT.

(2) Remove the coaxial cable from the RF connector located on the right side of the receiver cabinet.

(3) Remove four Phillips head screws from the RF connector and unscrew (CCW) the RF connector.

(4) Remove the RF module from the receiver cabinet.

(5) Inspect the remote enclosure to make certain that a 100 MHz limiter-driver amplifier is not included (located on the front panel under a removable cover on the transmitter remote enclosure only). The transmitter and receiver remote enclosures are identical, except that only the transmitter uses that amplifier.

(6) Remove the remote kit replacement panel and its attached wire harness assembly from the storage location beneath the T1 patch panel. (This panel will replace the RF module in the receiver cabinet.)

(7) Connect the wire harness assembly Cannon connector to its mate at the rear of the receiver cabinet.

(8) Install the remote kit replacement panel in the receiver cabinet.

(9) Connect a handset to the jack in the replacement enclosure.

(10) Attach the remote cable to the Bendix connector on the front of the replacement panel.

(11) Insert the RF module into the remote enclosure.

(12) Install the RF connector (previously mounted in the receiver cabinet) in the side of the remote enclosure. Align the gasket and connector holes with the holes in the enclosure after the RF connector has been screwed into the RF module receptacle by backing off slightly from the tightest position. Install the four Phillips head screws in the RF connector.

(13) Install the receiver remote enclosure. (Instructions for installation are contained in the MAS manual. The MAS should be erected to the first section only, to allow access to the receiver and transmitter RF modules for tuning purposes.)

(14) Connect the receiver RF input to port number 3 on the circulator.

(15) Connect circulator port number 2 to the antenna.

(16) Connect the remoting cable between the equipment shelter RF entrance panel and the receiver remote enclosure.

(17) Connect a handset to the receiver remote enclosure.

3.2.4.4(c) Transmitter Operation. The following steps are necessary to initiate operation of the TCM-604B transmitter.

NOTE: If two transmitters are to be used, the following instructions should be repeated, step-for-step, alternately for each transmitter.

(1) Turn the power supply circuit breaker ON. The power supply ON lamp should illuminate and the power supply FAULT lamp should be off. The synthesizer fault lamp should extinguish within five seconds. The AFC FAULT lamp may not extinguish until transmitter tuning has been performed.

(2) With the DEVIATION TEST switch ON, check the following control monitor meter readings (The FAULT lamp on the control monitor will be illuminated while the DEVIATION TEST switch is on.):

PARAMETER	METER ZONE
+15 VDC	Green
-15 VDC	Green
-28 VDC	Green
Xmtr Power	Black
Synth	Blue
Carrier Dev	Blue*
AFC ERR	Black**
Ch 1 Carr	Blue***
Ch 1 Dev	Blue***
Ch 2 Carr	Not Used
Ch 2 Dev	Not Used

* Reading is present only when baseband input is applied or when the test tone switch on the baseband module is at BB. Carrier deviation may be checked initially using the test tone. When baseband input is present, the BB test tone should be off and the baseband attenuator control set to produce the proper deviation meter reading.

** AFC Error may read outside the black zone if the transmitter is detuned. After performing the transmitter tuning procedure, assure that the correct reading is attained.

*** Reading is present only when the Audio 1 input is applied or when the test tone switch is at AUD 1. Levels may be checked initially using the test tone. When the Audio 1 input is present, the audio test tone should be off and the audio Channel 1 attenuator set to produce the proper Ch 1 Deviation meter reading.

(3) Turn the DEVIATION TEST switch to OFF.

(4) Return the control monitor meter switch to its TRANSIT position.

(5) Check the following remote enclosure meter readings:

PARAMETER	METER ZONE
-15 V	Green
+15 V	Green
+28 V	Green
AFC ERR	Black*
SYNTH	Blue

* AFC Error may read outside the black zone if the transmitter is detuned. After performing steps (7) and (8), assure that the correct reading is attained.

(6) Switch the AFC switch on the AFC module to DISABLE. (The fault lamps on the AFC module and control monitor module should illuminate.)

(7) Tune the RF module direct reading frequency indicator to the receive frequency (This is in preparation for an RF loop.). Adjust the frequency for zero center indication on the AFC meter. (This will require coordination between the individual tuning the transmitter and a second individual observing the meter in the shelter.)

(8) Switch the AFC switch to the ENABLE position. (All fault lamps should be off.)

3.2.4.4(d) Receiver Operation. Because the receiver RF head is remoted at the top of an unclimbable tower (MAS) in this configuration (Option 4), receiver tuning must be performed before the RF head is raised to an inaccessible height. This is required because the receiver does not use a crystal-controlled local oscillator; it employs a tracking AFC circuit that locks onto the received signal. The following steps are required to pretune and initiate operation of the TCM-604B receiver.

NOTE: If two receivers are to be used, the following instructions should be repeated, step-for-step, alternately for each receiver.

(1) Turn the power supply circuit breaker to ON. The power supply ON lamp should illuminate and the power supply FAULT lamp should be off.

(2) Check the following control monitor meter readings:

PARAMETER	METER ZONE
+15 V	Green
-15 V	Green
-28 V	Green

(3) Return the control monitor meter switch to its TRANSIT position.

(4) Check the above readings on the remote RF module meter also. (Note that the remote enclosure meter selector switch must be left in its TRANSIT position when the remote meter is not in use.)

(5) Switch the AFC switch located on the AFC module to DISABLE. (The AFC FAULT lamp and the control/monitor alarm lamp will be illuminated while the AFC switch is in the DISABLE position.)

(6) Tune the preselector filter to the proper receive carrier frequency. (The direct reading dial is accurate to within plus or minus 2 MHz.)

(7) Set the control/monitor meter select switch to the THRESHOLD position.

(8) Tune the local oscillator to the proper frequency for each link. As the proper frequency is approached, a reading will be attained on the THRESHOLD meter. When the THRESHOLD level approaches center scale, switch the meter to read SIGNAL STRENGTH. Tune the local oscillator to peak the signal strength level. Do not retune the (broadband) preselector filter; dial accuracy is sufficient to result in the proper setting.

(9) While observing the AFC meter on the AFC module, tune the local oscillator slightly above and below the point where peak signal strength was attained. (This will require coordination between the individual tuning the local oscillator at the remote enclosure and a second individual observing the AFC meter reading in the shelter.) The AFC meter reading must swing equal distances above and below center scale as the local oscillator is tuned. (If the swings are not equal, the local oscillator is tuned to a side band of the incoming signal. Tune the local oscillator a small amount in each direction until equal AFC swings are observed.) Then, center the AFC meter readings between the swings (center scale).

(10) Switch the AFC switch to the ENABLE position. All fault lamps extinguish. The receiver should lock onto the received signal.

(11) Turn the remote enclosure meter select switch to the AFC ERR position. Tune the local oscillator for a zero center scale AFC Error reading.

(12) Place the meter select switch in the TRANSIT position.

(13) Check the following control/monitor meter readings:

PARAMETER	METER ZONE
Signal Strength	Black
Threshold	Blue
Demod	Blue
IF Output	Blue
Carrier Dev	Blue*
AFC ERR	Green
Ch 1 Dev	Blue**
Ch 2 Dev	Not Used

* Baseband modulation must be present.

** Channel 1 modulation must be present.

(14) Close and secure the cover on the receiver remote enclosure.

(15) Place the power supply circuit breaker on the transmitter to its OFF position.

(16) Remove the two 30 dB coaxial attenuators between the transmitter RF output and the circulator. Connect the transmitter RF output to the RF input of the solid state amplifier.

(17) Remove the synthesizer module and set the thumbwheel switches to the proper transmit frequency for the link being restored. Reinstall the synthesizer module.

(18) Turn the power supply circuit breaker to ON.

(19) Switch the AFC switch to the DISABLE position.

(20) Tune the RF module direct reading frequency indicator to the transmit frequency. Adjust the frequency for zero center indication on the AFC meter.

(21) Switch the AFC switch to the ENABLE position. (All fault lights should be off.)

(22) Connect the RF output of the solid state amplifier through a 30 dB coaxial attenuator to the power meter detector mount. Set the meter range switch to "X 10".

(23) Make certain that the XMIT AMP circuit breaker, located on the antenna control panel over radio number 2, is in the OFF position. (This breaker controls AC power to the auxiliary outlets on the MAS pedestal.)

(24) Connect the solid state amplifier's AC power cable to an auxiliary outlet under the MAS pedestal.

(25) Place the power supply circuit breaker on the transmitter to its ON position.

(26) Measure output power. Convert the reading to watts (+30 dB) and record. This measurement will verify operation of the amplifier prior to MAS erection. (Power output of the solid state amplifier should exceed 1.5 watts.)

(27) Place the power supply circuit breaker on the transmitter to the OFF position.

(28) Place the XMIT AMP circuit breaker to the OFF position.

(29) Remove the 30 dB attenuator and power meter connections to the amplifier.

(30) Connect the RF output of the solid state amplifier to port number 1 of the circulator.

(31) Place the transmitter remote enclosure meter select switch to the TRANSIT position.

(32) Close and secure the cover on the transmitter remote enclosure.

(33) Proceed with MAS erection.

(34) When MAS erection is completed, place the XMIT AMP circuit breaker to the ON position.

(35) Place the power supply circuit breaker on the transmitter and receiver to the ON position.

(36) Align the antenna(s).

3.2.5 Antenna Alignment

The remote control unit, mounted in the relay rack directly above radio number 2, enables an operator to monitor and control the position of both antennas. At this point, it is assumed that the erection and checkout process, as outlined in the MAS manual, has been completed and operation of the antenna pointing controls are familiar to the operator.

Antenna alignment is performed while observing receive signal strength on the receiver control/monitor meter. Elevation angle should be set initially for near horizontal. Horizontal alignment is then performed by energizing the CW/CCW switch for each antenna to obtain a maximum reading on the meter. The same operation is then repeated for elevation by operating the UP/DOWN switches. The azimuth and elevation adjustments are repeated several times to optimize signal strength. Record the final signal strength meter reading.

Note the relative antenna positions and check these readings with the expected positions, listed in Section 2, for the applicable links. After final alignment of the antenna(s), place the azimuth/elevation power ON-OFF switch to the OFF position.

3.2.6 Orderwire

The orderwire common equipment is activated by turning on the 48 volt dc power supply, located below the VF patch panel.

3.2.6.1 Keyset Address Selection. The DTMF decoder detects and utilizes Dual Tone Multifrequency (DTMF) signals to provide selective address decoding functions. (DTMF signals are unique tone pairs, generated by standard Touch Tone encoder arrays.) Each button on a Touch Tone encoder is identified by the pair of frequencies generated when the button is pushed. Four low group frequencies correspond to the four rows of buttons and three high group frequencies correspond to the three columns, as in the following matrix:

	HIGH GROUP		
LOW GROUP	1209 Hz	1336 Hz	1477 Hz
697 Hz	1	2	3
770 Hz	4	5	6
852 Hz	7	8	9
941 Hz	*	0	#

The three DIP switches, labeled S1, S2 and S3, are programming switches for first, second and third digits, respectively. (DEB uses two digit codes; the third digit is not used. Instructions on configuring the key address selection for two digit operation were not available at this printing of this deployment manual.) The seven individual rocker switches on each programmer correspond to the seven frequencies making up the DTMF encoder array. Rocker switch 1 represents the 697 Hz tone; switch 2 represents the 770 Hz tone; and so on, in ascending frequencies to switch 7, which represents the 1477 Hz tone.

If, for example, the address code 35 is to be detected, close rocker switches on S1 to correspond to the two tones which represent a 3 on the DTMF matrix: 697 Hz and 1477 Hz, switches 1 and 7 on S1. The second digit, 5, is programmed into S2 by closing switches 2 and 6, corresponding to the tone pair 770 Hz and 1336 Hz.

3.2.6.2 Telephone Operation. The following steps are a step-by-step, call and answer procedure for the orderwire call director.

(1) Making a DTMF call:

(a) The handset is taken off-hook and the appropriate D line is depressed.

(b) The associated key lamp is illuminated in the steady state.

(c) Listen to the party-line to insure that your tones do not interrupt an orderwire call already in process.

(d) Dial the associated 2-digit number of the party being called on the pushbutton dial.

(e) Wait for the party at the distant to answer.

(2) Receiving a DTMF call:

(a) On incoming DTMF signals, a flashing indication is present on the D line key, associated with the party initiating the call, and the interrupt audible alarm sounds.

(b) Take the handset off-hook; the flashing indicator changes to steady state.

(c) Conversation can now commence.

(3) Initiating a ringdown call (land line only):

(a) Pick up the handset and push the E line key, associated with the distant end station to be called.

(b) The associated key lamp is illuminated in the steady state.

(c) Depress the ringdown key (R). A 2600 Hz SF oscillator ring signal is heard in the receiver.

(4) Receiving a ringdown call from a ringdown orderwire:

(a) On an incoming ringdown signal, a flashing indication is present on the E line key, associated with the calling party and an audible alarm sounds.

(b) After picking up the handset (off-hook), the flashing indicator changes to steady state and the audible alarm stops.

(c) Conversation may now commence.

(5) Making a PBX call:

(a) Pick up the handset and depress the PBX line key.

(b) After the dial tone is heard, dial the number of the party to be called with the rotary dial.

(c) The ringing signal at the distant end can be heard in the receiver.

(6) Receiving a PBX call:

(a) On incoming PBX calls, a flashing indication is produced at the PBX key and an audible alarm is sounded.

(b) After the handset is picked up (off-hook) and the line key depressed, the flashing indication changes to a steady state and the audible alarm stops.

(c) Conversation may now commence.

(7) Intercom call-and-answer function:

(a) Initiating an intercom call requires only to pick up the handset (off-hook), depress the IC line key of the party to be called and depress the ringdown (R) key.

(b) An incoming ring from a distant end intercom produces a steady (off-hook) light and an audible alarm for the duration of the incoming ring.

(c) Go off-hook and depress the illuminated IC line key. Conversation can now commence.

(8) Hold function:

(a) An incoming caller can be placed on hold by depressing the associated line key and then depressing the H key.

(b) The line key lamp will now indicate, by winking, that the party is on hold. Taking a party from the hold position is accomplished by simply depressing the winking line key of the held line. The hold function is not applicable to the intercom circuits.

(9) Conference function:

(a) Two or more incoming callers are placed in conference by sequentially depressing a caller line key, then depressing the CON key, repeated for each caller.

(b) A party is released from conference by depressing the REL key.

(10) Local orderwire:

(a) To initiate an outgoing call to a distant end station:

- take the handset off-hook, and

- depress the call button for distant signaling.

(b) To receive an incoming call:

- The incoming E&M signal produces a lamp illumination and an audible alarm over the loudspeaker. The lamp remains illuminated for the duration of the incoming ring signal.

- By picking up the handset (going off-hook), the lamp is extinguished and the speaker alarm is stopped.

- Conversation can commence.

3.2.7 Alarm Status Unit

3.2.7.1 Controls and Indicators. All controls and indicators are located on the front panel. An external alarm bell is mounted on the outside of the fan housing closest to the Alarm Status Unit (ASU). The following table lists the controls and their functions.

Control or Indicator	Function
RESET	Acknowledges new alarm condition.
EXTERNAL ALARM	Selects the alarms that will cause an external (bell) alarm indication: OFF disables the external alarm. ALL permits any alarm to cause an external indication. MAJOR inhibits external indication of door and T1-4000 3-level alarms.
SONALERT	Provides an audible indication of all new alarm conditions.
Lights (16)	Provides visual indications of all alarm conditions. Blinking indicates a new alarm. A steady light indicates an acknowledged alarm.

3.2.7.2 Operating Instructions. The ASU operates from 120 volt AC power. Inactive equipment may indicate a new alarm condition at power up. RESET should be depressed to acknowledge this condition. Inactive equipment will normally indicate an acknowledged alarm condition.

A fault in the monitored equipment will initiate a new alarm condition. This is indicated by a flashing light (LED), indicating the faulted equipment, and an audible alarm. The new alarm condition will persist until either the fault is cleared or the alarm is manually acknowledged.

A new alarm condition is acknowledged by depressing the RESET button. This action will terminate the audible and external alarm indications and change the blinking LED to steady on. All new alarm indications are acknowledged simultaneously. The steady LED indication will persist until the equipment fault is cleared.

The external alarm may be triggered by a new alarm condition. The external alarm switch on the front panel selects the type of alarm condition that can cause an external alarm indication. The types are MAJOR, ALL (major and minor), and OFF (no external alarm). The MAJOR/MINOR designation of alarm inputs is shown in the table below. If a new alarm condition is cleared or acknowledged within 8 seconds, the external alarm will not be initiated. The external alarm will be extinguished when the alarm condition is acknowledged or cleared.

The shelter fault alarm system monitors 16 signals (plus tower lights) for alarm conditions. Each input is a contact closure. All contact closures, except DOOR, are normally open (NO) and close for fault conditions. The conditions are classified as major or minor as follows:

Signal	Classification
Door open	Minor
Fire	Major
XMTR #1	Major
RCVR #1	Major
XMTR #2	Major
RCVR #2	Major
FCC-97 #1 major alarm	Major
FCC-97 #1 3-level error	Minor
FCC-97 #2 major alarm	Major
FCC-97 #2 3-level error	Minor
FCC-97 #3 major alarm	Major
FCC-97 #3 3-level error	Minor
CY-104 #1	Major
CY-104 #2	Major
CY-104 #3	Major
CY-104 #4	Major

3.3 Type I A (AN/GSC-47)

3.3.1 Antenna Mounting

Provisions are made for mounting the antenna on a tripod or on a pipemount assembly.

3.3.1.1 Tripod. The following describes the sequence of steps to assemble the Type I A antenna on a tripod:

(1) Remove the tripod, positioning handle and pan/tilt head assembly from the protective canvas bag.

(2) Locate a level area. Extend the tripod legs fully and set up the tripod so that the legs are firmly planted and one leg is pointed away (180 degrees) from the direction the antenna will be pointed.

(3) Adjust the leg lengths to level the pan/tilt head to account for any terrain slope. (The vertical scale on the pan/tilt head should be set to zero.)

(4) Lock both azimuth and elevation adjustments.

(5) With a large screwdriver or socket wrench, assemble the L-bracket to the pan/tilt head by inserting the captive bolts into their respective mating threaded holes and tightening.

(6) Attach, as in (5), the L-bracket adapter to the L-bracket.

(7) Remove the antenna and radome from their protective canvas bag.

(8) Backout the flat-head screws located on the vertical portion of the L-bracket until they protrude from the L-bracket about one inch. (These screws serve to support the antenna while the antenna is aligned with the L-bracket mounting holes.)

(9) Hang the antenna rear flange on the flat-head screws, described in (8), and rotate until the mounting holes are aligned. Fasten the antenna securely to the L-bracket.

(10) Remove the feedhorn from its container. Insert the feedhorn into the antenna from the rear and secure with the captive bolts provided.

NOTE: When the feedhorn is secured to the antenna, polarization is stamped in the rear mating surface of the antenna. The polarization displayed must match the polarization of the antenna at the other end of the link. Check the polarization, as listed for the site in Sections 2.1 and 2.2.

(11) Fasten the positioning handle to the pan/tilt head.

(12) Attach the radome to the antenna with the hardware provided.

(13) Proceed with radio setup, as described in Section 3.3.2.

NOTE: When adjusting antenna elevation, be certain to support the L-bracket adapter at a point furthest from the antenna, before the elevation clamp is unlocked. This compensates for an imbalance, created by the additional weight of the radio.

3.3.1.2 Pipemount. The following describes the sequence of steps required to assemble the Type I A antenna on the pipemount:

(1) Remove the pipemount from the protective canvas bag.

(2) Assemble the pipemount on the prepared 4 1/2 inch O.D. pipe at the appropriate level.

(3) Attach the L-bracket to the pipemount at three points, as shown in Figure 59, with the hardware provided.

(4) Assemble the L-bracket adapter to the L-bracket and secure.

(5) Set the general elevation and azimuth angles desired.

(6) Remove the antenna and radome from their protective bag and assemble the antenna and feedhorn to the L-bracket, as in Section 3.3.1.1, (8) through (10), above.

(7) Attach the radome to the antenna with the hardware provided.

(8) Trim the azimuth angle with jack screws on the safety collar and the elevation angle with 5/8 inch nuts on the elevation rod.

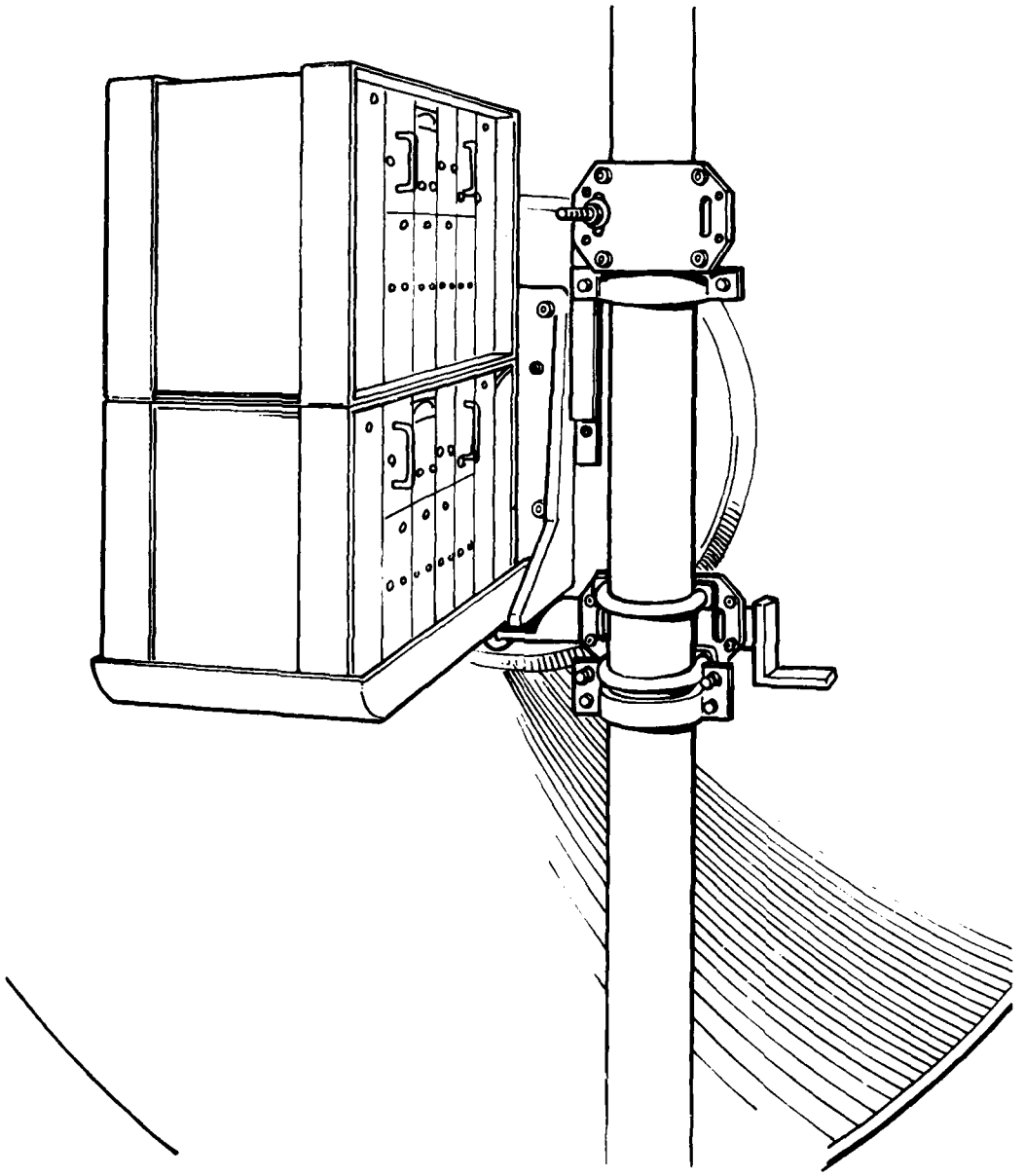
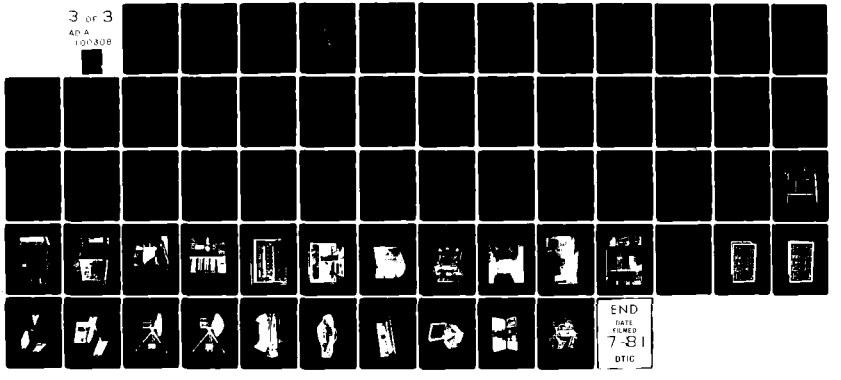


Figure 59. Type I A Antenna Pipemount

AD-A100 308 MITRE CORP BEDFORD MA F/G 17/2
DEB TYPE I RECONSTITUTION PACKAGE DEPLOYMENT MANUAL (RPDM).(U)
MAY 81 O H BRENDEN F19628-81-C-0001
UNCLASSIFIED MTR-8186 ESD-TR-81-123 NL



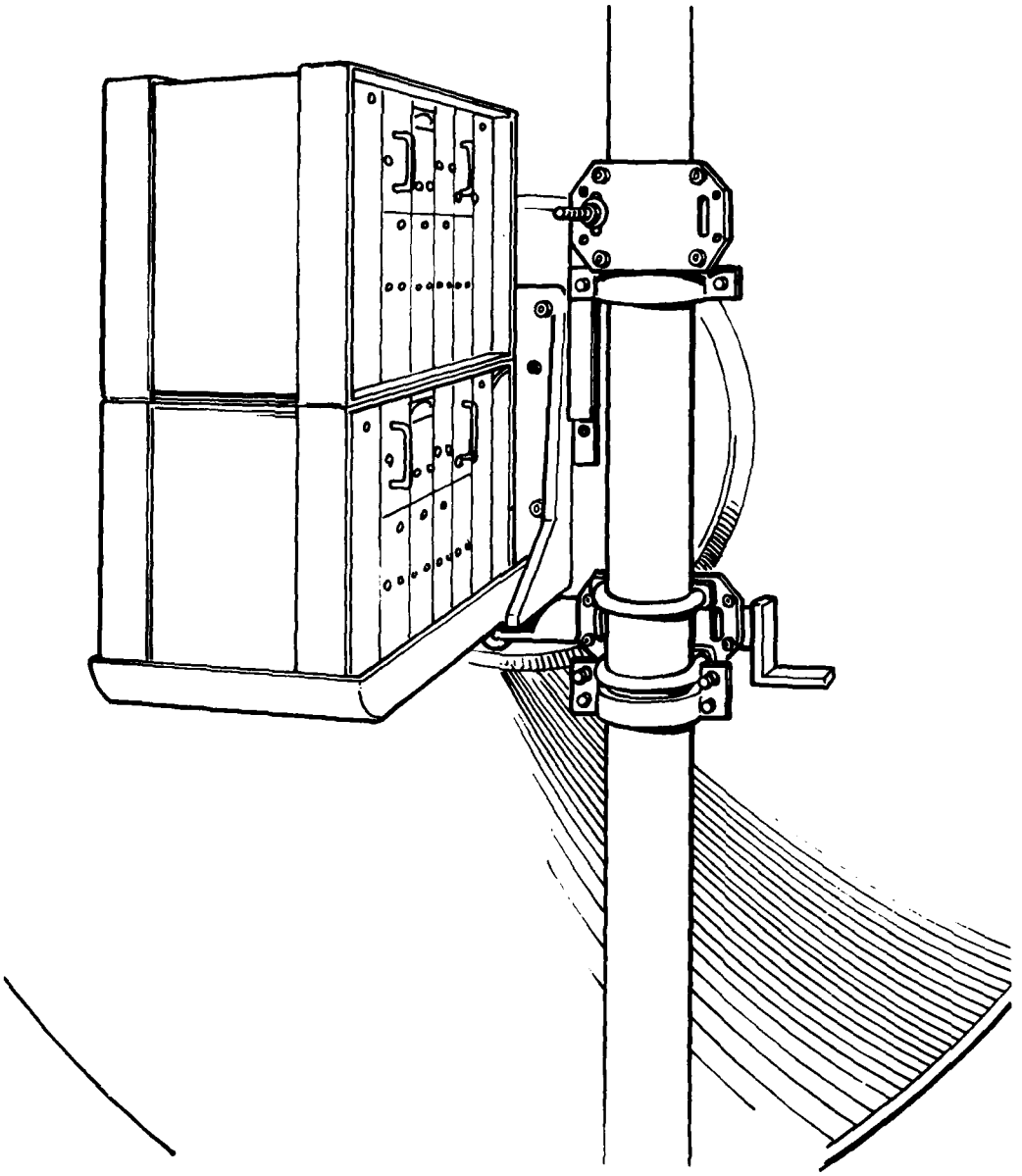


Figure 59. Type I A Antenna Pipemount

NOTE: When adjusting antenna pointing, the safety collar must be bolted solidly at all times so the mount will not slide down the pipe. All other bolts may be finger tight until the final position is determined. Tighten all bolts wrench tight at final assembly.

(9) Proceed with radio setup, as described in Section 3.3.2.

3.3.2 Microwave Radio Setup

The following steps for radio setup apply for either tripod or pipe mount installations.

(1) Place the radio receiver on the L-bracket adapter. The receiver should be oriented so that the RF connector is adjacent to the antenna feedhorn. When properly positioned, the receiver chassis feet should be seated in L-bracket indentations, restricting side-to-side motion.

(2) Place the radio transmitter on top of the receiver. Transmitter orientation should be the same as the receiver.

(3) Secure the receiver and transmitter to the L-bracket with straps and other hardware provided.

NOTE: If the solid state amplifier is not used, skip steps (4) through (6) and connect the transmitter directly to circulator port number 1 by coax cable.

(4) Place the solid state amplifier assembly astride the transmitter and fasten to the transmitter using the captive hardware provided. (The amplifier should be oriented offset, closest to the antenna feedhorn.)

(5) Connect the transmitter RF output to the IN port of the amplifier.

(6) Connect the amplifier RF OUT to circulator port number 1 by coax cable.

(7) Connect the receiver RF input directly to circulator port number 3 with a male-to-male coax connector (UG-573/U).

(8) Connect the antenna feedhorn to circulator port number 2 by coax cable.

(9) Connect AC power to the amplifier.

(10) Connect AC power to the transmitter and receiver.

3.3.3 Primary Power Generator

Prior to operation of the power generator, auxiliary fuel connections must be made, as shown in Figure 60. Hoses and fuel adapters are included with the generator for connection to a Jerry can, 55 gallon barrel, or other fuel container.

The following steps are required to initiate operation of the MEP-014A primary power generator:

(1) Starting:

(a) Place the LOAD ON-OFF switch to the OFF position.

(b) Rotate the rheostat counterclockwise, as far as it will go.

(c) Open the fuel shutoff valve. Close the choke (move the choke control lever away from the flywheel) for starting a cold engine.

(d) Place the ignition switch to the ON position.

(e) Wind the starter rope around the starter flange in a clockwise direction. Pull the rope briskly, to start the engine.

(f) Open the choke (move toward the flywheel) gradually, as the engine starts and warms, until the choke is fully open.

(g) Position the LOAD ON-OFF switch to the ON position for current output at the load terminals.

(h) Rotate the rheostat clockwise, to obtain the exact desired voltage.

(2) Stopping:

(a) Position the LOAD ON-OFF switch to the OFF position.

(b) Close the fuel shutoff valve by rotating it clockwise to shut off the fuel.

(c) Place the ignition switch into the OFF position.

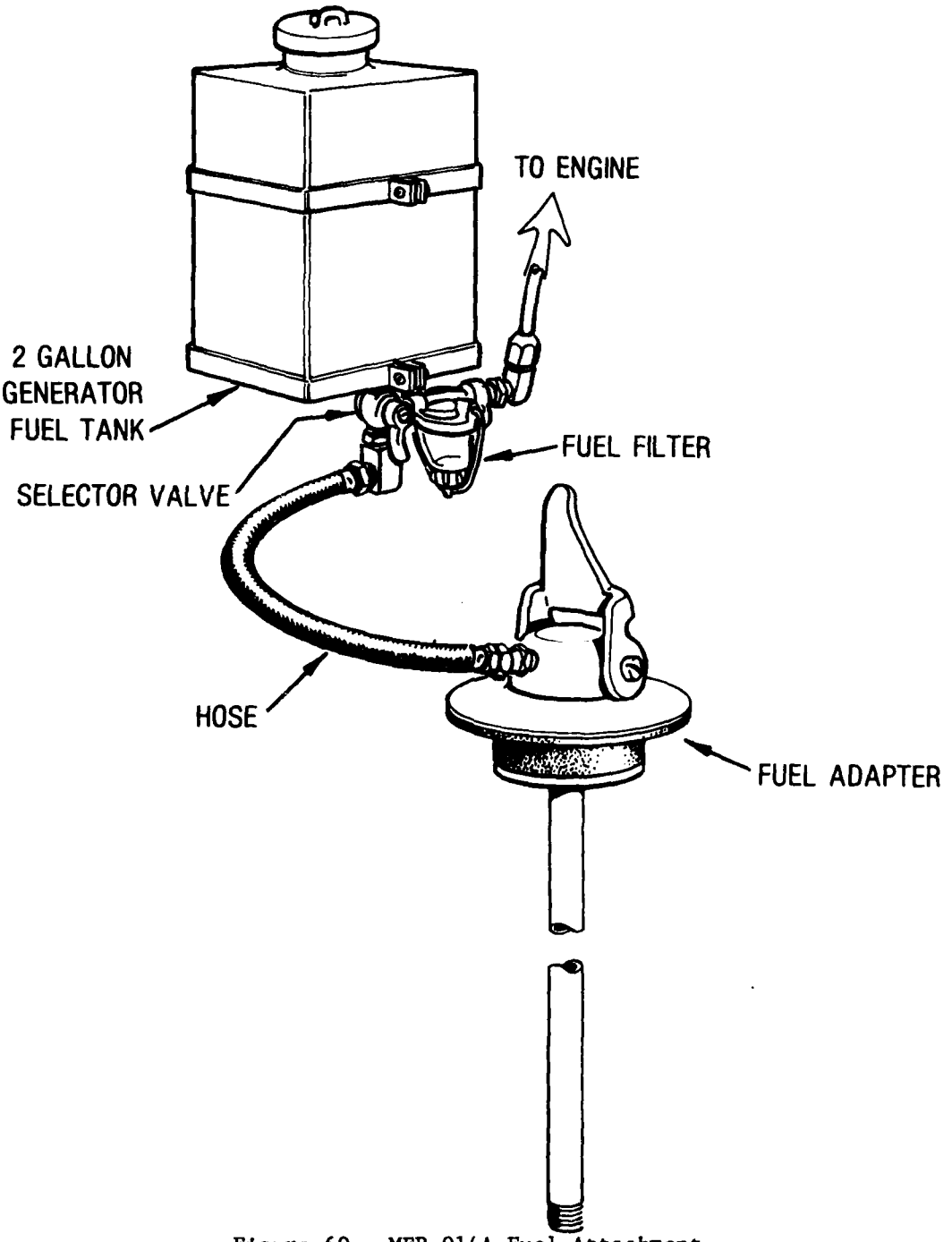


Figure 60. MEP-014A Fuel Attachment

(3) Operation in extreme cold (below 0 degrees F):

(a) Keep the fuel tank full, to avoid condensation and freezing.

(b) Service the fuel filter often enough to prevent bursting from water sediment freezing within it.

(c) Avoid accumulation of ice on generator set parts.

(d) Operate the set in a location that is protected from chilling winds, to permit easier servicing and better performance.

(e) Keep snow and ice out of the fuel supply to prevent the carburetor jets from becoming plugged.

(f) Avoid operating the generator set for short periods. A minimum of 30 minutes operation is required to evaporate water caused by the heating of cold metal parts.

(g) Allow at least five minutes of continuous engine operation before applying the load.

(h) Lubricate in accordance with the current lubrication order.

(i) Use the canvas cover to protect the unit when not in operation.

NOTE: See the MEP-014A manual for storage instructions. Always drain fuel when not in use.

3.3.4 Microwave Radio Operation

3.3.4.1 Transmitter. The following steps are required to initiate operation of the TCM-604B transmitter:

(1) Set the variable amplitude equalizer U-links (located in the baseband module) to the "zero feet" positions (E2 to E14 and E13 to E15).

(2) Make certain that the transmitter inputs are connected (both baseband and audio). Baseband input level is 1 volt peak-to-peak. (The baseband attenuator should be set at 5 dB.)

Audio input level is -5 dBm. (The audio attenuator should be set to 0 dB.)

(3) Set the digital frequency synthesizer thumbwheel switches to the proper link frequency. The switches are located inside the synthesizer module.

(4) Turn the power supply circuit breaker ON. The power supply ON lamp should illuminate and the power supply FAULT lamp should be off. The synthesizer fault lamp should extinguish within five seconds. The AFC FAULT lamp may not extinguish until transmitter tuning has been performed.

(5) With the DEVIATION TEST switch ON, check the following control monitor meter readings (The FAULT lamp on the control monitor will be illuminated while the DEVIATION TEST switch is on.):

PARAMETER	METER ZONE
+15 VDC	Green
-15 VDC	Green
-28 VDC	Green
XMTR Power	Black
Synth	Blue
Carrier Dev	Blue*
AFC ERR	Black**
Ch 1 Carr	Blue***
Ch 1 Dev	Blue***
Ch 2 Carr	Not Used
Ch 2 Dev	Not Used

* Reading is present only when baseband input is applied or when the test tone switch on the baseband module is at BB. Carrier deviation may be checked initially using the test tone. When the baseband input is present, the BB test tone should be off and the baseband attenuator control set to produce the proper deviation meter reading.

** AFC Error may read outside the black zone if the transmitter is detuned. After performing the transmitter tuning procedure, assure that the correct reading is attained.

*** Reading is present only when the Audio 1 input is applied or when the test tone (TT SEL) switch is in the AUD 1 position. Levels may be checked initially using the test tone. When the Audio 1 input is present, the audio

test tone should be off and the audio channel attenuator set to produce the proper Ch 1 Deviation meter reading.

(6) Turn the DEVIATION TEST switch to OFF.

(7) Switch the AFC switch on the AFC module to DISABLE. (The fault lamps on the AFC module and control monitor module should illuminate.)

(8) Tune the direct reading frequency indicator to the desired transmitter frequency. Watching the front panel AFC meter on the AFC module, adjust the frequency for a zero center indication.

(9) Switch the AFC switch to the ENABLE position. (All fault lamps should be off.)

3.3.4.2 Receiver. The following steps are required to initiate operation of the TCM-604B receiver:

(1) Assure that the receiver outputs are correctly patched (both baseband and audio Ch 1).

(2) Adjust the baseband attenuator to the 0 dB position (output level: 1 volt peak-to-peak). Adjust the audio Ch 1 attenuator to the 5 dB position (output level: -5 dBm).

(3) Turn the power supply circuit breaker ON.

(4) Check the following control/monitor and RF module meter readings:

PARAMETER	METER ZONE
+15 V	Green
-15 V	Green
-28 V	Green

(5) Switch the AFC switch located on the AFC module to DISABLE. (The AFC FAULT lamp and the control/monitor alarm lamp will be illuminated while the AFC switch is in the DISABLE position.)

(6) Tune the preselector filter to the incoming carrier frequency. (The direct reading dial is accurate to within plus or minus 2 MHz.)

(7) Set the control/monitor meter select switch to the THRESHOLD position.

(8) Tune the local oscillator to the proper link frequency. As the frequency is approached, a reading will be observed on the THRESHOLD meter. When the THRESHOLD level approaches center scale, switch the meter to read SIGNAL STRENGTH. Tune the local oscillator to peak the signal strength level. Do not retune the (broadband) preselector filter; dial accuracy is sufficient to result in the proper setting.

(9) While observing the AFC meter on the AFC module, tune the local oscillator slightly above and below the point where peak signal strength was observed. The AFC meter reading must swing equal distances above and below center scale as the local oscillator is tuned. If the swings are not equal, the local oscillator is tuned to a side band of the incoming signal. Tune the local oscillator a small amount in each direction until equal AFC swings are observed. Then, center the AFC meter readings between the swings (center scale).

(10) Switch the AFC to the ENABLE position. All fault lamps should extinguish.

(11) Turn the control/monitor meter to the AFC ERR position. Tune the local oscillator for a zero center scale AFC error reading.

(12) Check the following control/monitor meter readings:

PARAMETER	METER ZONE
Signal Strength	Black
Threshold	Blue
Demod	Blue
IF Output	Blue
Carrier Dev	Blue*
AFC Error	Green
Ch 1 Dev	Blue**
Ch 2 Dev	Not Used

* Baseband modulation must be present.

** Channel 1 modulation must be present.

3.3.5 Orderwire Telephone

Two types of orderwire telephone keysets were produced for the Type I A system: a prototype keyset, designed and constructed by The MITRE Corporation, and an operational keyset, manufactured by Raven Electronics Corporation. The former unit is not supportable in the military inventory and was produced for interim use until the Raven unit was made available. The MITRE keyset can serve as an emergency backup to the Raven telephone. Both units have been delivered to the responsible agencies and will operate equally well with the TerraCom radios. The following operating instructions are applicable to the keyset indicated.

3.3.5.1(a) Radio Interface (MITRE). Radio interface cables are provided for connection between the orderwire telephone and one or two TerraCom radios. The RCVR plug connects to the AUD OUT CH 1 jack on the radio receiver and the XMTR plug connects to the AUD IN CH 1 jack on the radio transmitter. The RADIO A jack is used for one radio. When two radios are used, the second radio is connected to the RADIO B jack.

> CAUTION: The receiver and transmitter jacks on the radio are identical. Check the cable connector markings before making connections.

3.3.5.1(b) Radio Interface (Raven). Radio interface cables are provided for connection between the orderwire telephone and one or two TerraCom radios. Two four-wire ports are provided and are accessible via two pairs of environmental connectors mounted on the right side of the enclosure.

The 51010A-100 portable orderwire system may be called from either radio via a user-selectable two or three digit DTMF address. Upon receipt of a correct address, the orderwire system gives an audible alert indication via a sonalert mounted on the inside top panel. Going OFF HOOK with the handset extinguishes the alert and establishes voice paths. A volume control knob mounted on the inside top panel provides manual adjustment of the handset's receiver level.

The user may call out from the orderwire on both radios by simply going OFF HOOK and selecting digits on the keypad mounted on the inside top panel.

The power cord is removable and may be stored inside the unit during transport. A power switch is mounted on the inside top panel, along with a fuse.

3.3.5.2(a) Address Selection (MITRE). A two-digit DTMF address is programmed into the decoder by two DIP switch arrays. The switches are located on the main printed circuit board (See the Type I A Orderwire Telephone Technical Manual.). Access is afforded by removal of the front panel. Correspondence between the switch settings and the unit address is shown in the following table:

Code	Freq.	Switch	Freq.	Switch
1	697	1	1209	5
2	697	1	1336	6
3	697	1	1477	7
4	770	2	1209	5
5	770	2	1336	6
6	770	2	1477	7
7	852	3	1209	5
8	852	3	1336	6
9	852	3	1477	7
*	941	4	1209	5
0	941	4	1336	6
#	941	4	1477	7

The switch assembly for each digit consists of seven rocker switches on a DIP assembly. Two of the seven switches are turned ON (not open) to select an address. The other five are open. For example, to set an address to 48, the code for "4" would be set into the first digit's switches and the code for "8" would be set into the second digit's switches. The switches for "4" are 2 and 5. These would be set ON and switches 1, 3, 4, 6, and 7 would be open. The switches for "8" are 3 and 6. Therefore, digit two would have switches 3 and 6 ON and switches 1, 2, 4, 5, and 7 open.

3.3.5.2(b) Address Selection (Raven). Switch S4 determines whether two digits or three digits are required for addressing (DEB Stage I sites use a two digit code). Close position #2 of S4 for two digit addressing (position #1 of S4 for three digit addressing). Take care not to leave both positions of S4 closed at the same time.

Switches S1, S2 and S3 are the programming switches for the first, second and third digits, repectively. The ten individual rocker switches of each programming switch correspond to the ten decimal numbers of a standard DTMF keypad.

For example, suppose the two-digit address, 15, is to be detected as correct. Position 1 of S1 should be closed and position 5 of S2 should be closed. Only one position in each, S1 and S2, should be closed at a time.

3.3.5.3(a) Startup and Shutdown (MITRE). Power and signal lines are connected to the unit when the cables are installed. Therefore, the orderwire telephone is ready for operation as long as the power is on and the interface cables are connected. Incoming calls are indicated audibly, by an alarm, and visually, by a flashing light. When the HOOK switch is moved to the TALK position, the flashing light changes to a steady on condition to indicate that the call is answered and the line is busy. This action also stops the audible indicator. Completion of the call is accomplished by returning the HOOK switch to the STANDBY position, which will extinguish the light. The local audible indicator can be inhibited by placing the ALARM switch in the OFF position. The level of the sound from the ear piece of the head/set can be adjusted by the VOLUME control. The VOLUME control affects only the volume in the ear piece. The level to the radios cannot be adjusted from the front panel.

Either the handset or the headset can be connected to the appropriate front panel jack. Connecting the headset will disable the handset jack.

3.3.5.3(b) Startup and Shutdown (Raven). Instructions for startup and shutdown for the Raven unit were not available for this printing of the deployment manual.

3.3.6 Antenna Alignment

Antenna alignment is performed by observing receive signal strength on the receiver control/monitor meter. The elevation angle should be set initially for near horizontal. Horizontal alignment is then performed by loosening the horizontal clamp and swiveling the antenna for maximum reading on the receive signal strength meter. The same operation is then repeated for elevation alignment (See the note in Paragraph 3.3.1.1(13).). The above procedure is repeated several times, to optimize signal strength. All clamps are then securely tightened.

4.0 PREPARATION FOR REDEPLOYMENT

Since the reconstitution packages will not be stored where they are to be used, preparation for deployment, or redeployment, is important. Except during periodic system check-out times, the reconstitution packages should be ready for immediate transportation to any DEB Stage I site. This means that every piece of equipment must be accounted for and in its proper container or storage location. Of equal importance is careful repacking of the system after a reconstitution exercise. The following paragraphs are intended to assist the reconstitution teams in packing or repacking, transporting, and storing the reconstitution packages.

4.1 Type I (AN/GSC-48)

4.1.1 Generators

The following steps should be taken to prepare the generators for shipment:

(1) Shut down the generator sets as per Section 3.2.1.2(3).

(2) Disconnect all electrical connections.

(3) Disconnect grounding connections.

(4) Disconnect the auxiliary fuel supply, if used.

(5) Secure all panels and doors on the generator sets.

(6) Wind the synchronizer power cables onto their cable reels and secure the reels to the generator fenders.

The following is a packing list for the PU-405/M generators:

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
1.	6115-922 -8690	Generator Set, Diesel Engine Model SF-15-MD	2	0	2
2.	2330-331 -2307	Chassis, Trailer: Generator 2 1/2 Ton, 2 Wheel, M200A1	2	0	2
3.	NSN	Switch Box Assembly Tobyhanna Army Depot (TOAD)	1	0	1
4.	NSN	Reel, Cable RC-405/TR P/N B 5931	3	0	3
5.	NSN	Cable, Paralleling TOAD	2	0	2
6.	NSN	Cable, Stub (15 ft.) TOAD Drwg. A1-13824D	2	0	2
7.	NSN	Cable, (100 ft.) TOAD Drwg. A1-13823D	1	0	1

4.1.2 MAS

The MAS must be packed on the transit frame in the proper sequence to make certain that all equipment is secure and that the MAS will not suffer damage during transit. Detailed instructions for disassembly and packing of the MAS are contained in the OE-308/U manual.

4.1.3 Equipment Shelter

The following instructions are intended to aid in preparation of the equipment shelter for deployment or redeployment. They are not necessarily all-inclusive or rigidly ordered.

(1) Place all circuit breakers in the OFF position.

(2) Disconnect all connecting cables from the shelter.

(3) Disconnect ground wires.

(4) Coil all cables onto their respective cable reels.

(5) Disconnect all external shelter RF connections (waveguide).

(6) Install all connector dust covers.

(7) Install, or close, all shelter entry panel/dust covers and secure.

(8) Store all loose cables, connectors, tools and parts.

(9) Store all manuals.

(10) Remove KG-34s from the CY-104A units.

(11) Install and secure all equipment cover plates (CY-104A, T1-4000, TCM-604B, Oscilloscope, and Test Set).

(12) Roll up the floor mat and store it between the relay racks.

(13) Install and secure the cable reel rack in the shelter.

(14) Install the accessory box and secure it to the shelter floor.

(15) Close and secure the entry door.

The following is a packing list for the Type I reconstitution package shelter:

	STOCK NUMBER	AND NOMENCLATURE	OPER.	SPARES	TOTAL
	NSN	Digital European Backbone Reconstitution Shelter	1	0	1
		Consisting of:			
1.	5410-117-2868	Shelter, S-280 B/G	1	0	1
2.	NSN	Sling, Shelter per SC-D-36423	1	0	1
3.	7920-543-7148	Brush, Dust	1	0	1
4.	6545-922-1200	First Aid Kit	1	0	1
5.	5120-900-6096	Hammer, Sledge, 8#	1	0	1
6.	4210-270-4512	Fire Extinguisher #5	1	0	1
7.	7520-162-6178	Pencil Sharpener	1	0	1
8.	5120-234-8910	Screwdriver, Flat Blade 6" shaft, 5/16" blade	1	0	1
9.	5120-988-7074	Screwdriver, Phillips #2	1	0	1
10.	NSN	Screwdriver, Phillips #1	1	0	1
11.	5975-224-5260	Ground Rod MX-148/G	4	0	4
12.	9920-682-6757	Ash Tray	2	0	2
13.	4520-177-6198	Heater, Electrical 1500 watt	3	0	3
14.	6645-410-2395	Clock, Electric, 9 V DC	1	0	1
15.	5110-293-2339	Ax, Single Blade	1	0	1
16.	8130-656-1090	Reel, 435/U	6	0	6
17.	NSN	Matting, Rubber, 1/8 Nom. Black, Type 1; Class A per SPEC. ZZ-M-710 Size: 34 in. x 124 in.	1	0	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
18.	NSN	Blower, Assy, CCW 9 o'clock Blast per DL-SC-A-539900	1	0	1
19.	NSN	Blower, Assy, CW 9 o'clock Blast per DL-SC-A-539897	1	0	1
20.	NSN	Compressor - Dehydrator P/N 1930 B; 120 V, 60 Hz Andrew Corp. Orland Park, Ill. 60462 SN-0277	1	0	1
21.	NSN	Regulating Tank P/N 31614-3 Andrew Corp.	1	0	1
22.	NSN	Gas Distribution Manifold P/N 6600 B Andrew Corp.	1	0	1
23.	NSN	Pump, Dry-Air Hand P/N 878 A Andrew Corp.	1	0	1
24.	NSN	Hose Assembly (for P/N 878A) P/N 10195 Andrew Corp	1	0	1
25.	NSN	Fitting, Nitrogen Tank P/N 858 C Andrew Corp.	1	0	1
26.	NSN	Adapter (for P/N 858 C) P/N 35751 Andrew Corp.	1	0	1
27.	NSN	Desiccant, Refill, Silica Gel P/N 210 Andrew Corp.	4	0	4

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
28.	NSN	Viewer, Door, 1" dia (2 - 2 3/4) P/N 363 Balwin Co. Reading, Pa.	1	0	1
29.	NSN	Skid, Elasto II (Modified) Craig System Corp. Lawrence, Mass.	3	0	3
30.	NSN	Level, Indicators G-691 P/N B 44518 Craig System Corp. Lawrence, Mass.	2	0	2
31.	NSN	Bench, Drawer P/N 2788 Lyon Metal Products Arora, Ill.	6	0	6
32.	NSN	Cabinet, Series 1200 P/N 1230 S-30 Drawer Art Steel Co. Bronx, N. Y.	1	0	1
33.	NSN	Valve, Pressure Relief P/N 414B, 2-way Stratotech Co. El Segundo, Cal. 90245	1	0	1
34.	NSN	Lock, Combination P/N 8077A CL1/CL2 per FED SPEC FF-P-110 Sargent & Greenleaf Rochester, New York	5	0	5
35.	NSN	Lock, Combination Safe Master P/N 50 Sargent & Greenleaf	1	0	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
36.	NSN	Kit, Jacking, for S-280 B/G Shelter	1	0	1
		Consisting of:			
	NSN	Jack Assembly 2500# Cap.	4	0	4
	NSN	Jack Pad 10" X 28"	4	0	4
	NSN	Jack Adapter (mounted) Craig System Corp.	4	0	4
37.	NSN	Kit, Mobilizer for Shelter S-280 B/G Ref. SC-D-595001 with the following components:	1	0	1
	NSN	Angle Assy P/N 6600135-501	4	0	4
	NSN	Screw, Hex Hd MS90725-34	88	0	88
	NSN	Washer, Lock MS35338-43	88	0	88
	NSN	Rivnut S31B200 CSI	88	0	88
38.	6240-152-2996	Lamp, Fluorescent	17	3	20
39.	6240-179-1814	Lamp, Glow NE-45	0	10	10
40.	6240-299-5876	Lamp, Glow NE-34	1	1	2
41.	NSN	Starter, for Fluorescent FS-204 (W-S-755)	17	5	22
42.	NSN	Lamp, Cold Start per SC-C-681179	14	0	14
43.	NSN	Adapter, Waveguide, Rectangular to Eliptical P/N 171 AC Andrews Corp.	2	0	2

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
44.	NSN	Flexible Waveguide P/N 51727-36 Andrews Corp. Each consisting of:	2	0	2
	NSN	Clamp, Quick Disconnect P/N 680051 Airtron (Div of Litton) 200 E. Hanover Ave. Morris Plains, N. J. 07950	1	0	1
45.	NSN	Transition, WR-112 Waveguide to Type "N" P/N 59210-112 Andrews Corp. (or equivalent)	12	2	14
46.	NSN	Dual Directional Coupler Omega Model 337	2	0	2
47.	NSN	Circulator, Waveguide Ano Laboratories Model B3-J15320	2	0	2
48.	NSN	Waveguide Twist Omega Model 767	3	0	3
49.	NSN	Switch, Waveguide Systron Donner Model 612A1	2	0	2
50.	NSN	Waveguide, H-plane 90 degree bend	2	0	2
51.	NSN	Waveguide, E-plane 90 degree bend	1	0	1
52.	NSN	Waveguide, WR-112, 12"	1	0	1
53.	NSN	Waveguide, WR-112, 6"	1	0	1
54.	NSN	Variable Attenuator, Waveguide Systron Donner Model DBH-430	2	0	2

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
55.	NSN	Oscilloscope, AN/USM 425(V)1 Tektronix Model 465M	1	0	1
56.	NSN	Test Set, Model 3550B Hewlett Packard	1	0	1
57.	NSN	Multimeter, AN/PSM-37	1	0	1
58.	NSN	Power Meter Narda Model 8401 w/Detector Mount Model 8420	1	0	1
59.	NSN	Frequency Counter Hewlett Packard Model HP5340A	1	0	1
60.	NSN	Keyset, Type IB Philco Ford	1	0	1
61.	NSN	Headset (for Keyset) Type IB Philco Ford	1	0	1
62.	NSN	Phone Set (for Keyset) Type IB Philco Ford	1	0	1
63.	NSN	Storage Unit, Extender Board	1	0	1
64.	NSN	TDM (T1-4000), Extender Board VICOM 4015-01	1	0	1
65.	NSN	TDM, (T1-4000), Fuse & Lamp Kit P/N 15180-010	1	0	1
66.	NSN	PCM, (TSEC/CY-104A) Extender, Common Equip. ON014930 VICOM 3100-01	1	0	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
67.	NSN	PCM, (TSEC/CY-104A) Span Terminating Shelf Extender 0N014932 VICOM 3020-01	1	0	1
68.	NSN	PCM, (TSEC/KG-34) Element Extender 0N056236-1	1	0	1
69.	NSN	PCM, (TSEC/KG-34) Element Extractor 0N056450	1	0	1
70.	NSN	PCM, (TSEC/KG-34) Cable Extender 0N057352	1	0	1
71.	NSN	Plug-in Unit Extender TerraCom	1	0	1
72.	NSN	Smoke Detector Model CS-3 Pyrotronics 8 Ridgedale Ave. Cedar Knolls, N. J. 07927	1	0	1
73.	NSN	Lamp Cord Reel & Lamp P/N 963 Daniel Woodhead Co. North Brook, Ill. 60062	1	0	1
74.	NSN	Receptacles, Lightning Arrester with hardware P/N 41-306 Cook Electric Morton Grove, Ill. 60053	0	20	20
75.	NSN	Insert, Lightning Arrester P/N 41-3500 Cook Electric	0	20	20
76.	NSN	Bulb, 50 watt	1	0	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
77.	NSN	Flood Light Assembly	4	0	4
		Each consisting of:			
	NSN	Lamps, PAR-38 150 PAR/RL General Electric	2	0	2
	NSN	Lamp Holder Assembly P/N 40-L Black Keene Lighting Union, N. J.	2	0	2
	NSN	Aiming Box Horiz. Mtg. P/N 146 Keene Lighting	1	0	1
78.	NSN	Storm Kit	1	0	1
		Consisting of:			
	5120-134-4725	Handle, Holding	1	0	1
	4030-580-8258	Anchor Guy, AL Alloy, Type 1, Size 6, Grade A, Style 4	4	0	4
	5975-405-4505	Guy Assy, Lower Per SM-D-561889	4	0	4
	NSN	Shackle, Anchor P/N 3558T52 McMaster Carr Supply Chicago, Ill.	8	0	8
	NSN	Sling, Wire Rope, 3/8 dia. Type 4; 6 X 19 Construction 5 ft. long McMaster Carr	4	1	5
	NSN	Rod, Driving, for Anchor Guy	1	0	1
	NSN	Head, Driving for Driving Rod	1	0	1
79.	NSN	VICOM T1-4000 TDM Multiplexer (1/2 FCC-97) Vidar, Div. of TRW Inc. 77 Ortega Ave. Mountain View, Cal. 94040	3	0	3

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
80.	NSN	TCM-604B Transmitter/Receiver (7.7-8.4 GHz) TerraCom Corp. Div. of Conic Corp. 9020 Balboa Ave. San Diego, Cal. 92123	2	0	2
81.	NSN	TCM-6HR (RCVR) (enclosure unwired) TerraCom	0	1	1
		Consisting of:			
	NSN	"B" RCVR Module	0	1	1
	NSN	"IF" RCVR Module	0	1	1
	NSN	"AFC" RCVR Module	0	1	1
	NSN	"RF" RCVR Module TerraCom Corp.	0	1	1
82.	NSN	TCM-6HT (XMTR) (enclosure unwired) TerraCom	0	1	1
		Consisting of:			
	NSN	"AC" Power Supply Module	0	1	1
	NSN	"B" XMTR Module	0	1	1
	NSN	"SYNC" XMTR Module	0	1	1
	NSN	"AFC" XMTR Module	0	1	1
	NSN	"RF" XMTR Module TerraCom Corp.	0	1	1
83.	NSN	TCM-6RK-1 Standard Remoting Kit (XMTR) TerraCom	2	0	2
		Consisting of:			
	NSN	Remoting Box (wired)	1	0	1
	NSN	Remote Kit Connector Module TCM-6RRKM	1	0	1
	NSN	Handset	1	1	2

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
84.	NSN	TCM-6RK-1 Standard Remoting Kit (RCVR) TerraCom	2	0	2
		Consisting of:			
	NSN	Remoting Box (wired)	1	0	1
	NSN	Remote Kit Connector Module	1	0	1
85.	NSN	Circulator/Barrel TCM-6CIR TerraCom Corp.	2	1	3
86.	NSN	Tuneable Preselector (7.7 to 8.4 GHz) TerraCom Corp.	2	0	2
87.	NSN	Power Amplifier, Solid State, (7.7 to 8.4 GHz) TCM-SSPH TerraCom Corp.	2	1	3
88.	NSN	TWT Amplifier (7.7 to 8.4 GHz) Model 1177H02R039 Type 648-HD-299 Hughes Aircraft Co. 3100 W. Lomita Blvd. Torrance, Cal. 90509	2	1	3
89.	NSN	Power Supply, 48 volt DC P/N LCS-C-48	1	0	1
		Consisting of:			
	NSN	Rack Adapter P/N LRA-5	1	0	1
	NSN	Meter Panel P/N MP-3LCS-C-48	1	0	1
	NSN	Panel Blank P/N LBP-60	1	0	1
	NSN	Panel Blank P/N LBP-50 Lambda Electronic Corp.	1	0	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
90.	NSN	Control Panel, Mast/Antenna Subsystem P/N 107-000 Radiation Systems Inc.	1	0	1
91.	NSN	Cable Assy., Control Panel Mast/ Antenna Subsystem P/N 107-500 Radiation Systems Inc.	1	0	1
92.	NSN	Alarm Status Unit	1	0	1
93.	NSN	Bell Alarm, Vibrating Wheelock Model DVR-6 Standard Electric 1339 Main Street Waltham, Mass. 02154	1	0	1
94.	NSN	Spare Parts Kit for Alarm Status Unit	1	0	1
		Consisting of:			
	5961-050- 021-5010	LED & Mount 249-7871-3331-504 Dialight	0	1	1
	5962-01- 050-8719	IC, CD 4071BE RCA	0	2	2
	5962-01- 015-5314	IC, MC14011B Motorola	0	5	5
	5962-01- 072-0924	IC, CD4049UBE RCA	0	2	2
	5962-01- 047-7394	IC, MC14001B Motorola	0	2	2
	5962-01- 053-5487	IC, CD4078BE RCA	0	2	2
	5962-01- 049-6815	IC, CD4098BE RCA	0	1	1
	5962-01- 050-5506	IC, MC14050B Motorola	0	2	2
	5962-01- 078-2550	IC, CD4013BE RCA	0	5	5
	NSN	IC, CD4002BE RCA	0	1	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
95.	NSN	Electronic Card Mounting Rack 5820-ND-880-557F P/N 10304-1	2	0	2
96.	NSN	(PCB) Conference Bridge 5820-ND-880-553F P/N 1662-1	2	0	2
97.	NSN	(PCB) Line Amplifier 5820-ND-880-554F P/N 1661-2L1	8	0	8
98.	NSN	Attenuator, Programmable 5820-ND-880-55F (PCB) P/N 1663-2	6	0	6
99.	NSN	Transformer, 600/75 Ohm coupling 5820-ND-880-556F (PCB) P/N 1691-8G	8	0	8
100.	NSN	Filter Assembly			
		Consisting of:			
	NSN	Low Pass Filter, 2.4 kHz 5820-ND-880-553F P/N 1492	1	0	1
	NSN	High Pass Filter, 2.75 kHz 5820-ND-880-534F P/N 1493	1	0	1
101.	NSN	Multiplexer, TSEC/CY-104A	4	0	4
		Each consisting of:			
	NSN	HY-12A Assembly	1	0	1
	NSN	HN-74 Assembly	1	0	1
	NSN	KG-34 Assembly	1	0	1

	STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
102.	NSN	Patch Cords, Bantam P/N PJ-714 ADC Products Minneapolis, Minn. 55435	21	0	21
103.	NSN	Patch Cords P/N PJ-068 Switchcraft No. 89QB89	2	0	2
104.	5995-01- 679-8475	Patch Cords P/N PJ-051 Switchcraft	10	0	10
105.	NSN	Patch Cords, Bantam P/N PJ-718 ADC Products	5	0	5
106.	NSN	Patch Cords, Baseband P/N PCW-18-75 Trompeter Electronic Inc. Chatsworth, Cal. 91311	6	0	6
107.	NSN	Patch Cords, Baseband P/N PCWX-36-75 Trompeter Electronic Inc.	3	0	3
108.	NSN	Patch Cords, T1 P/N PTW-24-48 Trompeter Electronic Inc.	20	0	20
109.	NSN	Patch Cords, T1 P/N PTWX-36-78 Trompeter Electronic Inc.	4	0	4
110.	NSN	Patch Cords, Baseband P/N PCM-36-75 Trompeter Electronic Inc.	2	0	2
111.	NSN	Patch Cords, CY-104A	14	0	14
112.	NSN	Plug, Looping, T1 P/N LPLT-78 Trompeter Electronic Inc.	16	0	16

	STOCK NUMBER AND NOMENCLATURE	OPER.	SPARES	TOTAL
113. NSN	Plug, Looping, Baseband P/N LPLW-75 Trompeter Electronic Inc.	6	0	6
114. NSN	Cable, Baseband (100 ft.) Belden 9231 (Video Cable FR-1)	2	0	2
115. NSN	Cable, Signal (100 ft.) Tower A/C Warning Lights	1	0	1
116. NSN	Cable, Aux Pwr (100 ft.) 208 V AC, 50 Hz, 3 Wire, Generator to Fixed Site	1	0	1
117. NSN	Cable, (100 ft.) TOAD DRWG. A1-13823D (Power to Shelter)	1	0	1
118. NSN	Cable, Stub (15 ft.) TOAD DRWG A1-13824D	1	0	1
119. NSN	Cable XMIT/RCV P/N TCM-6RK-100 TerraCom Corp.	8	0	8
120. NSN	Cable, Ground #4/0 (25 ft.)	3	0	3
121. NSN	Mount, 4 or 6 Ft. MASAR Antenna per DRWG. P1D-128 (Rev. B) Prodelin Inc. Hightstown, N. J.	2	0	2
122. NSN	Mount, Pipe, "L" Bkt. For 4 ft. Portable reflector per DRWG. 12011895 (Rev. A) Prodelin Inc.	2	0	2
123. NSN	Dip Clip IC Test Clip Model 3916 ITT Pomona	1	0	1
124. NSN	Hardware Kit P/N UG-FLG Andrew Corp.	0	1	1

	STOCK NUMBER AND NOMENCLATURE	OPER.	SPARES	TOTAL
125. NSN	Flange, Pressure Adapter P/N 55675-112 Andrew Corp.	0	2	2
126. NSN	Extractor Tool CET-C6B ITT Cannon	1	0	1
127. NSN	Cable Extender for for TerraCom Radio TerraCom Corp.	1	0	1
128. NSN	Circuit Board C-Pilot Oscillator P/N 12011616 TerraCom Corp.	0	3	3
129. NSN	Circuit Board C-Pilot Detector P/N 12011617 TerraCom Corp.	0	3	3
130. NSN	Circuit Board, Dual Sub-Carrier Notch Filter P/N 12010137-X2 TerraCom Corp.	0	3	3
131. NSN	Test Cable Kit TCM-6TCK TerraCom Corp.	1	0	1
132. NSN	Attenuator, Set of:			
NSN	TCM-AT6 (6 dB)	2	0	2
NSN	TCM-AT10 (10 dB)	2	0	2
NSN	TCM-AT20 (20 dB)	2	0	2
NSN	TCM-AT30 (30 dB) TerraCom Corp.	2	0	2
133. NSN	Connector UG-57B/U	4	0	4
134. NSN	Connector UG-29B/U	4	0	4
135. NSN	Connector, Right Angle UG-27D/U	12	6	18

STOCK NUMBER AND NOMENCLATURE		OPER.	SPARES	TOTAL
136. NSN	Connector UG-21B/U	0	4	4
137. NSN	Coax Jack, P/N J3W Trompeter Electronic Inc.	0	2	2
138. NSN	Manual, Maintenance P/C TCM-6 TerraCom Corp.	1	0	1
139. NSN	Manual, Service P/N TCM-6 TerraCom Corp.	1	0	1
140. NSN	Manual, ASU ESD-TR-80-132 "DEB Type I Alarm Status Unit Technical Manual"	1	0	1
141. NSN	Manual, TWT Amplifier Model 1177H02R039 Hughes Aircraft Co.	1	0	1
142. NSN	Manual, Smoke Detector Type CS-3 Pyrotronics	1	0	1
143. NSN	Manual, Line Amp. Model 1661-4L1 PulseCom Falls Church, Va. 22041	2	0	2
144. NSN	Manual, Programmable Attenuator, Model 1663-2L1 PulseCom	1	0	1
145. NSN	Manual, Telephone Keyset, Type IB Philco-Ford	1	0	1
146. NSN	Manual, Power Supply Model LCS-C-Series Lambda Electronic Corp. Melville, L.I, N.Y. 11746	1	0	1
147. NSN	Manual, Heater, Oper. Maint. & Service	1	0	1

	STOCK NUMBER AND NOMENCLATURE	OPER.	SPARES	TOTAL
148. NSN	Repair Part Sheet, Heater	1	0	1
149. NSN	Manual, Bridging Amp. Model 1661-2L1 & L2 PulseCom	1	0	1
150. NSN	Manual, Mounting Shelves Model 1030-1L1 & 2L1 PulseCom	1	0	1
NSN	Instruction Bulletin #37310	1	0	1
NSN	Instruction Bulletin #37311	1	0	1
NSN	Instruction Bulletin #37146	1	0	1
151. NSN	Manual, Digital Multiplexer PSB-6020 Vidar	1	0	1
152. NSN	DEB Type I Reconstitution Package Deployment Manual (RPDM) ESD-TR-81-123	1	0	1
153. NSN	Mast/Antenna Subsystem OE-308/U Technical Order (15 May 79) Radiation Systems Inc.	1	0	1

4.1.4 Transportation

As an aid to transportation planning, the following sections present basic information pertaining to transportation of Type I equipment to DEB Stage I sites. Included are weights, overall dimensions, transit modes, and special handling considerations which may be required.

4.1.4.1 Generators. The PU-405 A/M generators are mounted on a 2.5 ton modified M200A1 trailer chassis. Total weight of each power plant is 5155 pounds. Power plant dimensions, with the rear platform in its folded position, are

Length	166.38 inches
Width	95.50 inches
Height	85.0 inches

The generator trailer chassis has a retractable landing leg in front and step jacks in the rear. Extending downward from the rear of the frame is a retractable landing leg assembly used for support of the end or nose of the chassis, when uncoupled. It is equipped with a conventional tubular trailer axle with dual wheels and a spring suspension. A lunette is located at the front end of the frame for attachment to a vehicle with a drawbar or towing pintle.

The trailer chassis is towed by the 2.5 ton, 6 by 6 truck, M-35 or similar vehicle.

4.1.4.2 MAS

The Mast/Antenna Subsystem (OE-308/U) consists of:

Antenna Assembly,

Antenna Mounting Platform,

Feedhorn and Waveguide Assembly,

Power/Control Cable Assembly,

Tower Support Group AB-1277/U,

Interconnecting Group ON-212/U, and

Tool Kit.

The subsystem is housed in a MT-6096/U Shipping and Storage Container (Transit Frame). The transit frame is configured with brackets, fork lift channels, tie-down rings, and lifting rings, to facilitate rapid deployment by M-720 mobilizer (dolley set), M-35 truck, rail, fixed-wing or rotary-wing aircraft. The transit frame is covered with a tarpaulin to protect the stored components during transit and extended storage. A cable type tie-down assembly is also provided to aid in securing or lifting the pallet during transport. Total weight of the MAS is approximately 5000 pounds. Overall dimensions are

Length	120 inches
Width	87 inches
Height	80 inches

4.1.4.3 Equipment Shelter. The S-280( )/G Equipment Shelter may be transported by helicopter, railroad, M-35 truck, M-720 mobilizer (dolley set), and military cargo aircraft. Total weight of the shelter, when packed for deployment, is 5930 pounds. Overall dimensions are

Length	172 inches
Width	87 inches
Height	85 inches

The length dimension includes a 25 inch overhang for ventilation fans and Environmental Control Unit (ECU).

Note: Although an ECU is not provided, the shelter is configured to accept the Army A/E 32C-29 ECU.

If the shelter is transported by M-35 truck, these units will protrude over the truck cab. Loading and unloading the equipment shelter onto an M-35 truck can be accomplished by crane or a 407L Loading System.

Depending on the method chosen by the responsible agency for transporting the shelter during a reconstitution effort, consideration should be given to providing dedicated hoisting equipment to minimize reconstitution reaction time.

4.2 Type I A (AN/GSC-47)

4.2.1 Generators

The following steps should be taken in preparation for shipment of the MEP-014A generator:

(1) With the engine stopped, disconnect the load and ground wires.

(2) Disconnect the auxiliary fuel supply, if used.

(3) Coil and store cables for shipment.

(4) Drain fuel tank.

NOTE: See instruction manual for storage instructions.

4.2.2 Manpacks

The Type I A Reconstitution Package is frequently referred to as a "manpack", because each component can be handled by an average-size person. Due to the bulk of most of the components, however, it is recommended that the containers normally be carried by two people.

Disassembly of the Type I A system is essentially the reverse of assembly and no special instructions are required. However, it is important that each component be returned to its proper container (See Section 4.2.3.2.), to avoid confusion in the field and to reduce the possibility of arriving at a site with the wrong components. This is possible whenever only a part of the Type I A Reconstitution Package is utilized in conjunction with a Type I package, such as in reconstitution of a 3-way repeater, or for tactical interface.

4.2.3 Transportation

The following presents basic information pertaining to transportation of Type I A equipment to DEB Stage I sites, as an aid to transportation planning. Included are weights, overall dimensions and special handling considerations which might be required.

4.2.3.1 Generators. Generator dimensions and weight are

Length	20 5/8 inches
Width	18 inches
Height	18 inches
Weight	78 pounds

The MEP-014A generator is mounted in a tubular aluminum frame which doubles as a carrying handle.

4.2.3.2 Manpacks. Each manpack component container is equipped with carrying handles. However, it will be necessary to provide some mechanical means of transportation to convey the Type I A system to the mountaintop sites.

The following lists Type I A Reconstitution Package (manpack) components, container dimensions, and packed weights:

NO.	COMPONENT	CONTAINER	DIMENSIONS (inches)	WEIGHT (pounds)
1.	Transmitter	Fiberglas TCM-6SCRF	15 3/4 X 21 X 22	68

Digital Synthesizer, Option TCM-6DSO
Regulator Card, 5 volt, TCM-6PSR5
Low Pass Filter, 17.5 MHz, TCM-6LPF
Notch Filter, 8.1 MHz, PCNF-2
Notch Filter, 8.5 MHz, PCNF-2
FM Subcarrier Channel,
8.1 MHz, PC-2
C-Pilot Oscillator, 8.5 MHz, TCM-6CP
Repeater Operation Switch, TCM-6RO
Remote Fail Relay, TCM-RFR
Test Tone Circuit, TCM-6TT
Off Air Monitor/
Deviation Test, TCM-60M

2.	Receiver	Fiberglas TCM-6SCRF	15 3/4 X 21 X 22	68

Tunable Preselector Receiver, TCM-6TP
Regulator Card, 5 volt, TCM-6PSR5
Low Pass Filter, 17.5 MHz, TCM-6LPF
FM Subcarrier Channel,
8.1 MHz, PC-2
Subcarrier Notch Filter,
8.1 MHz, PCMF-2
C-Pilot Detector, 8.5 MHz, TCM-6CP
Subcarrier Notch Filter,
8.5 MHz, PCNF-2
Repeater Operation Switch, TCM-6RO
Test Tone Circuit, TCM-6TT
Receiver Baseband Mute, TCM-6BMR
Receiver, 70 MHz IF Output, TCM-6IFR
Remote Fail Relay, TCM-6RFR

NO.	COMPONENT	CONTAINER	DIMENSIONS (inches)	WEIGHT (pounds)
3.	Amplifier	Fiberglas, TCM-6SCRF	15 3/4 X 21 X 22	40
	Power Cord (15 foot)			
4.	Accessory	Fiberglas TCM-6SCRF	15 3/4 X 21 X 22	57
	Manual, TCM-6MM L-Bracket, TCM-6RHL L-Bracket Adapter, TCM-6LBA Field Service Test Kit, TCM-6FSTK RCV/XMIT Mounting Kit Circulator, TCM-6IR Coax Attenuator (30 dB), TCM-MT30 (Narda 757C) Coax Cable (3 foot), RG-58 BNC to Type N, UG-201A Adapters (2)			
5.	Antenna Feedhorn TCM-4AFP	Fiberglas TCM-6SCF	7 1/2 X 8 X 27 3/4	6
6.	Antenna/Radome 4 foot dia. Antenna (TCM-4AP), Radome (TCM-4UR)	Canvas Bag TCM-CCRA4	16 X 50 dia.	70
7.	Tripod TCM-6TPT	Canvas Bag TCM-6CCE-01	40 X 9 dia.	57
	Handle, Adjustment			
8.	Pipemount TCM-6RPP	Canvas Bag TCM-6CCE-02	28 X 8 dia.	27

NO.	COMPONENT	CONTAINER	DIMENSIONS (inches)	WEIGHT (pounds)
9.	Cables	Fiberglas TCM-6SCRF	15 3/4 x 21 x 22	25

Amplifier Mount
Straps for Amplifier Mount (4)
AC Extension Cord (50 foot)
RCVR/XMITR Power cables (1 ea.)
Baseband cables (2) (50 foot)
Belden 931 (Video FR-1)
Orderwire cables (50 foot) (2)
Orderwire alarm remote
cable (500 foot)
(1 per I A)
RF Cable (coax, 12 inch), Malex
RF Cable (coax, 18 inch), Malex
Type N right angle
connectors (3), UG-27C/U
Type N Male-to-male
connectors (2), UG-57B/U
Type N Female-to-female
connectors (2), UG-30D/U
Tool Kit (1 set per I A)
Long Nose Pliers (6 inch)
Screwdriver (3/8 inch blade)
Screwdriver (Phillips #1)
Side Cutters (Heavy Duty)
Box/Open End Wrench (7/16)

10a.	Orderwire (MITRE)	Aluminum	16 X 10 X 9	15

Handset, ITT/Telecomm,
6900(C3)410
Headset, Plantronics,
HS-908-1-B
Power Cable (6 foot)
Remote Alarm Unit

10b.	Orderwire (Raven 51010A)	Aluminum	12 X 11.6 X 8.8	10.5

NO.	COMPONENT	CONTAINER	DIMENSIONS (inches)	WEIGHT (pounds)
11.	Multiplexer T1-4000 with: Patch Cords (31 inch), M642/2-2 with PJ-051A connectors (9) Cable, interconnecting, (10 foot) RG-108/U with PL-75-9 connectors (16) Cable, interconnecting, (6 foot) Belden 8281 with UPL20-6 connectors (2) Cable, power (20 foot) MIL-C-3432D, with MS3116J-12-3S and Hubbel 5276 connectors. Wiring Diagram, Drwg. D9-4391C Manual, VICOM MK-11 D1 Terminal	Aluminum	28 X 27 X 26	157

Total weight of the Type I A manpack, excluding the generator, is approximately 1150 pounds. This includes two (2) of every component listed above, except No. 10 (Orderwire). Each container is clearly marked to aid in identifying the contents of each container.

> NOTE: Care must be taken to insure the return of each equipment component to its proper container, to avoid confusion in the field.

Each of the manpack containers is designed to be weatherproof, with the exception of the feedhorn container. However, the manpack should be stored in a warm, dry location to avoid accumulation of condensation moisture.

APPENDIX A

TYPE I (AN/GSC-48) EXHIBIT

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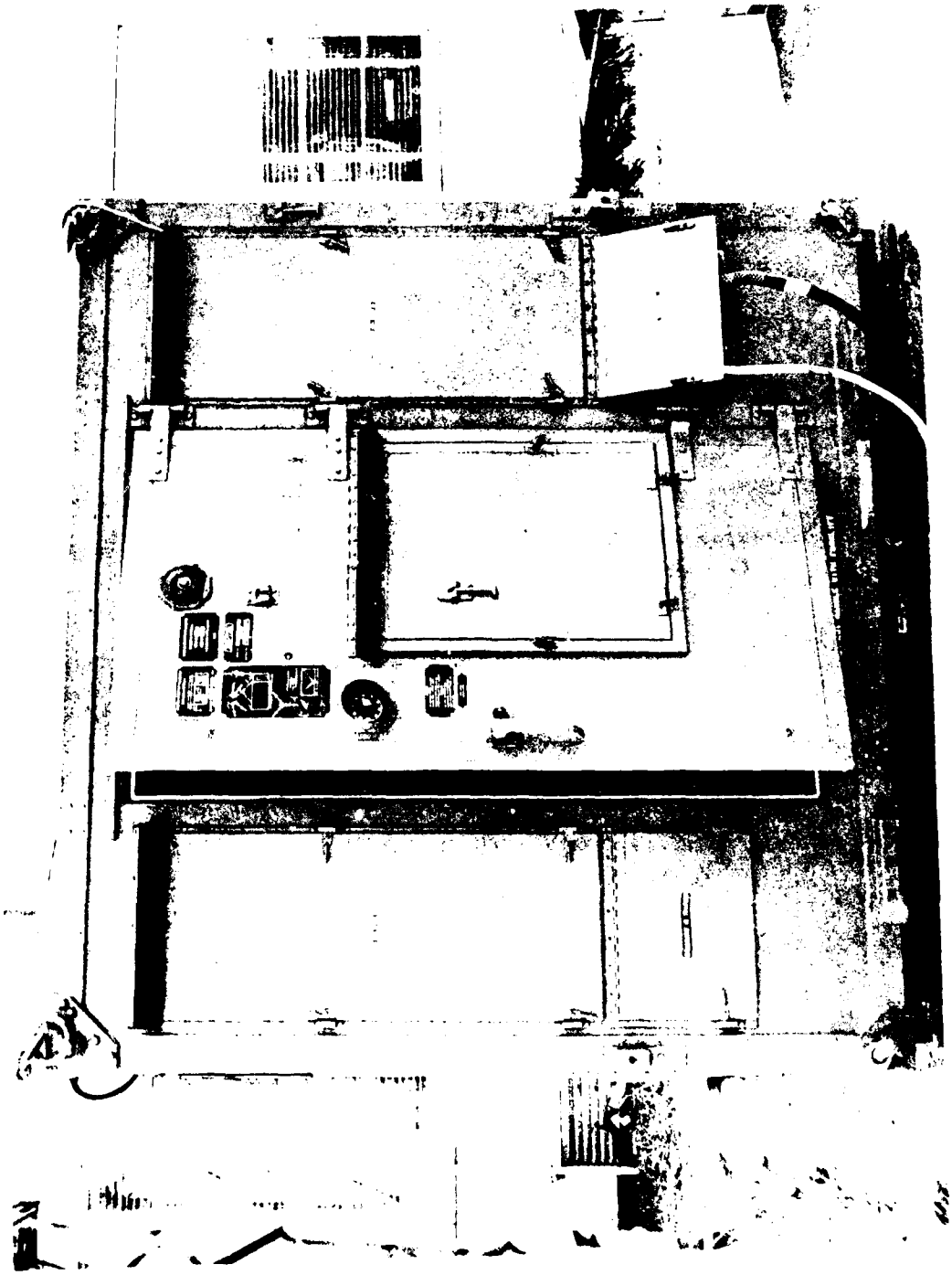
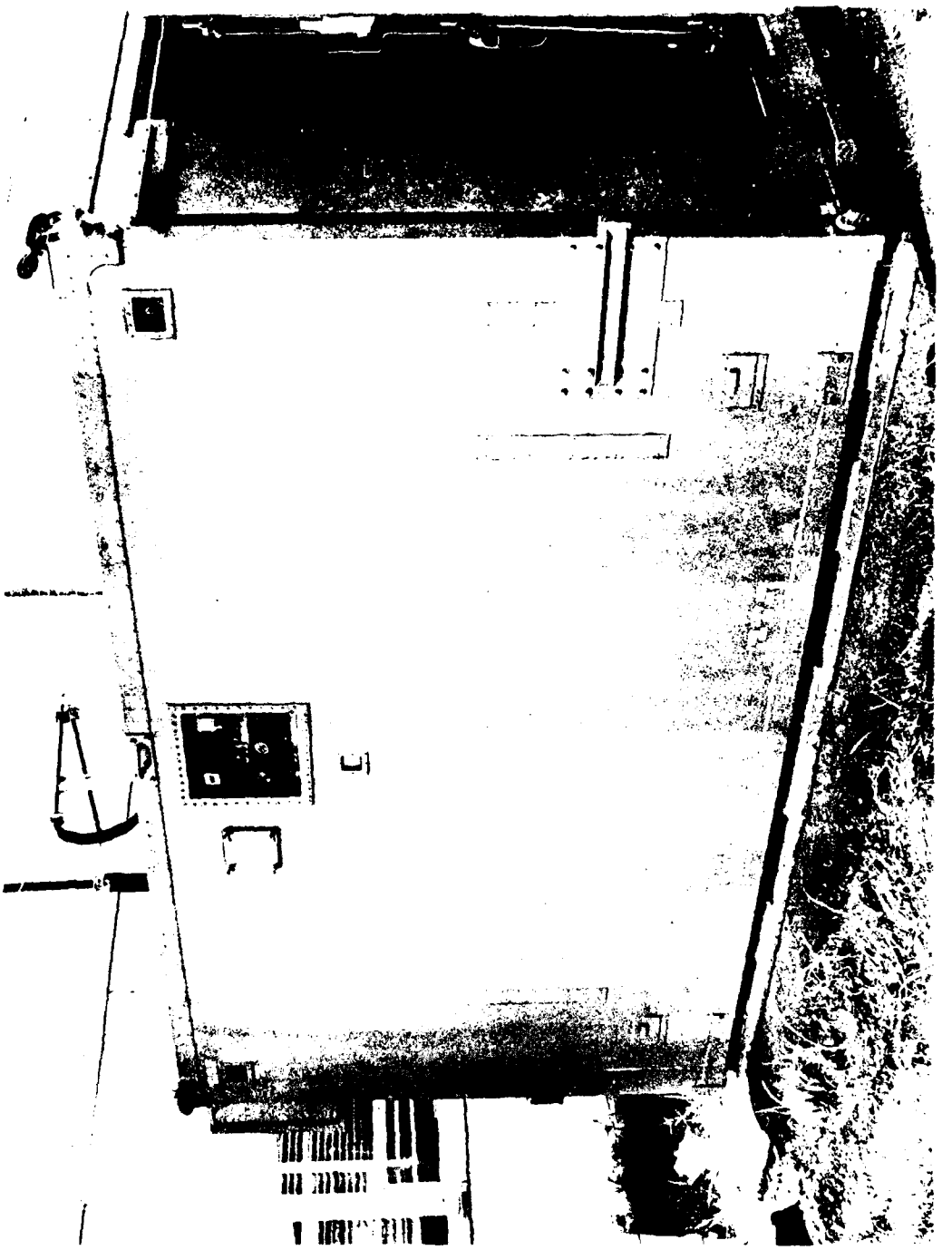
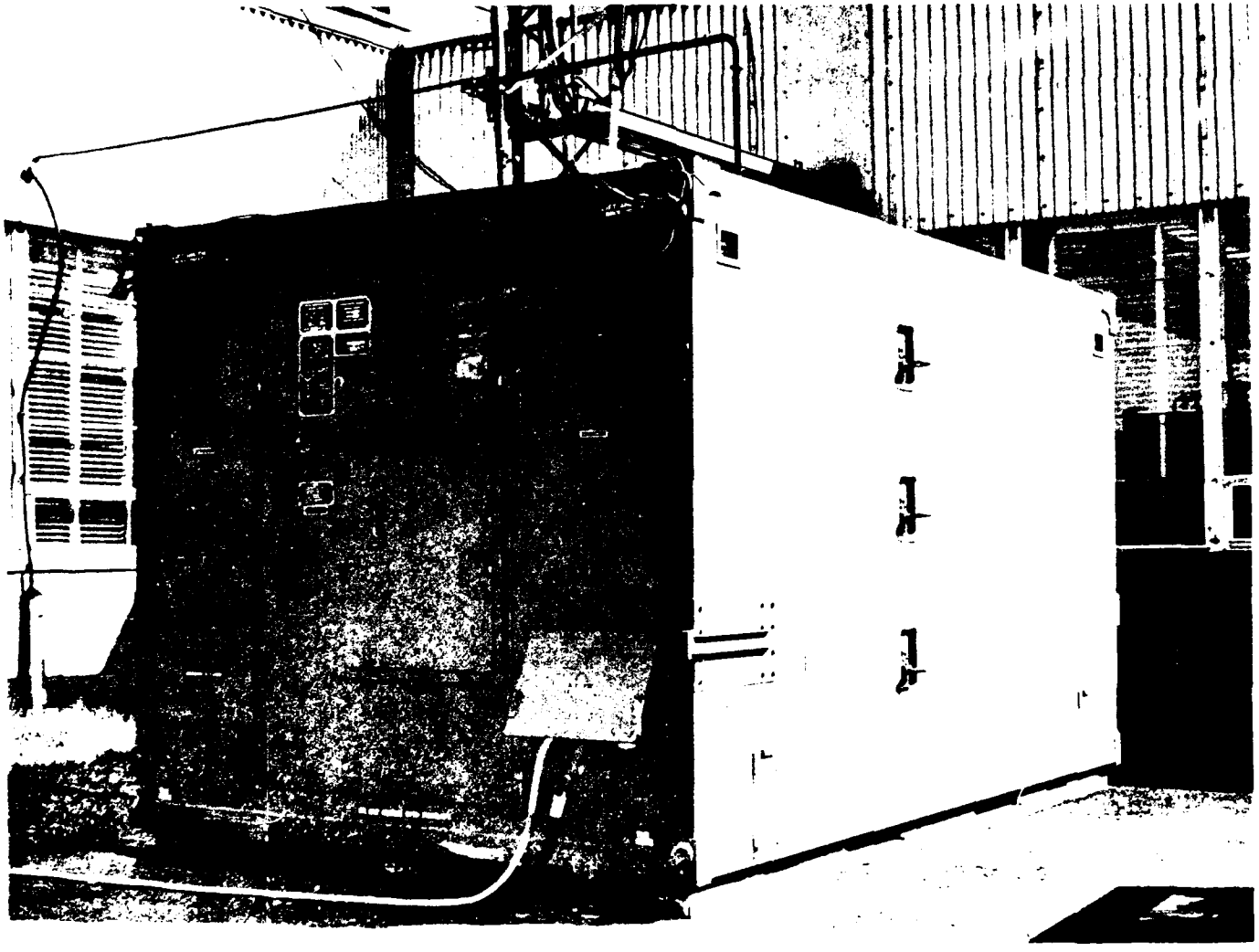


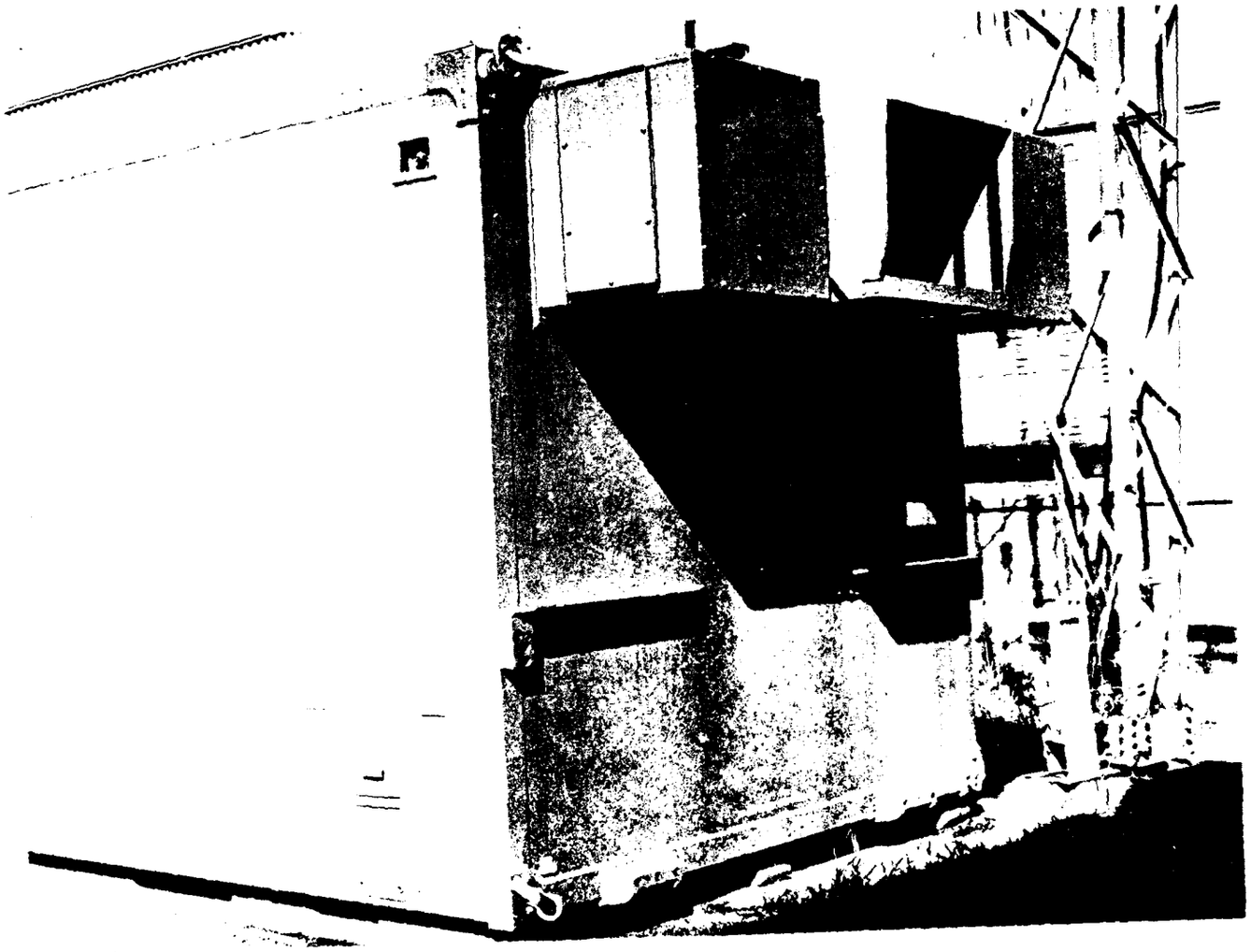
Equipment Shelter (Front)



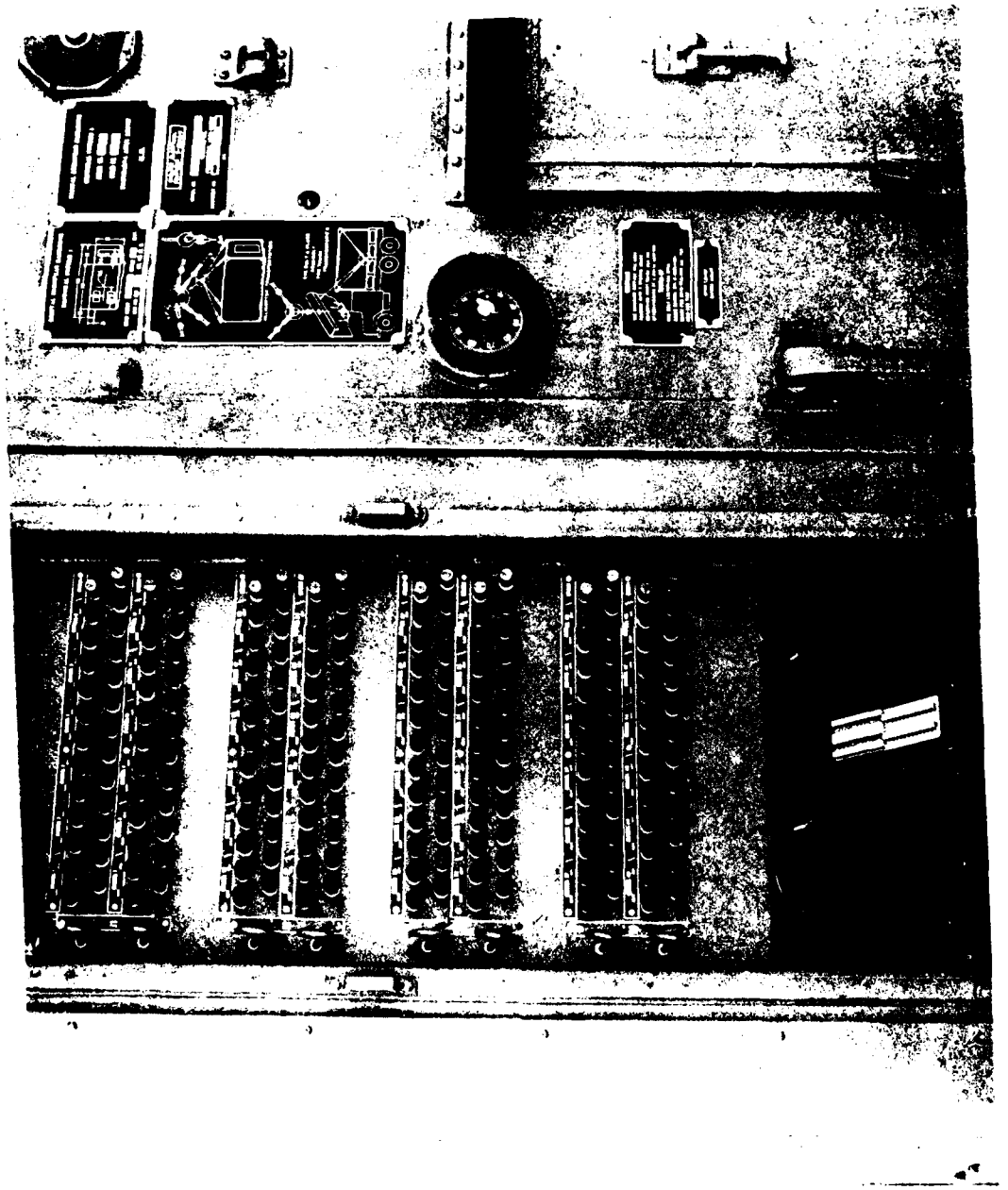
Equipment Shelter (Left side)



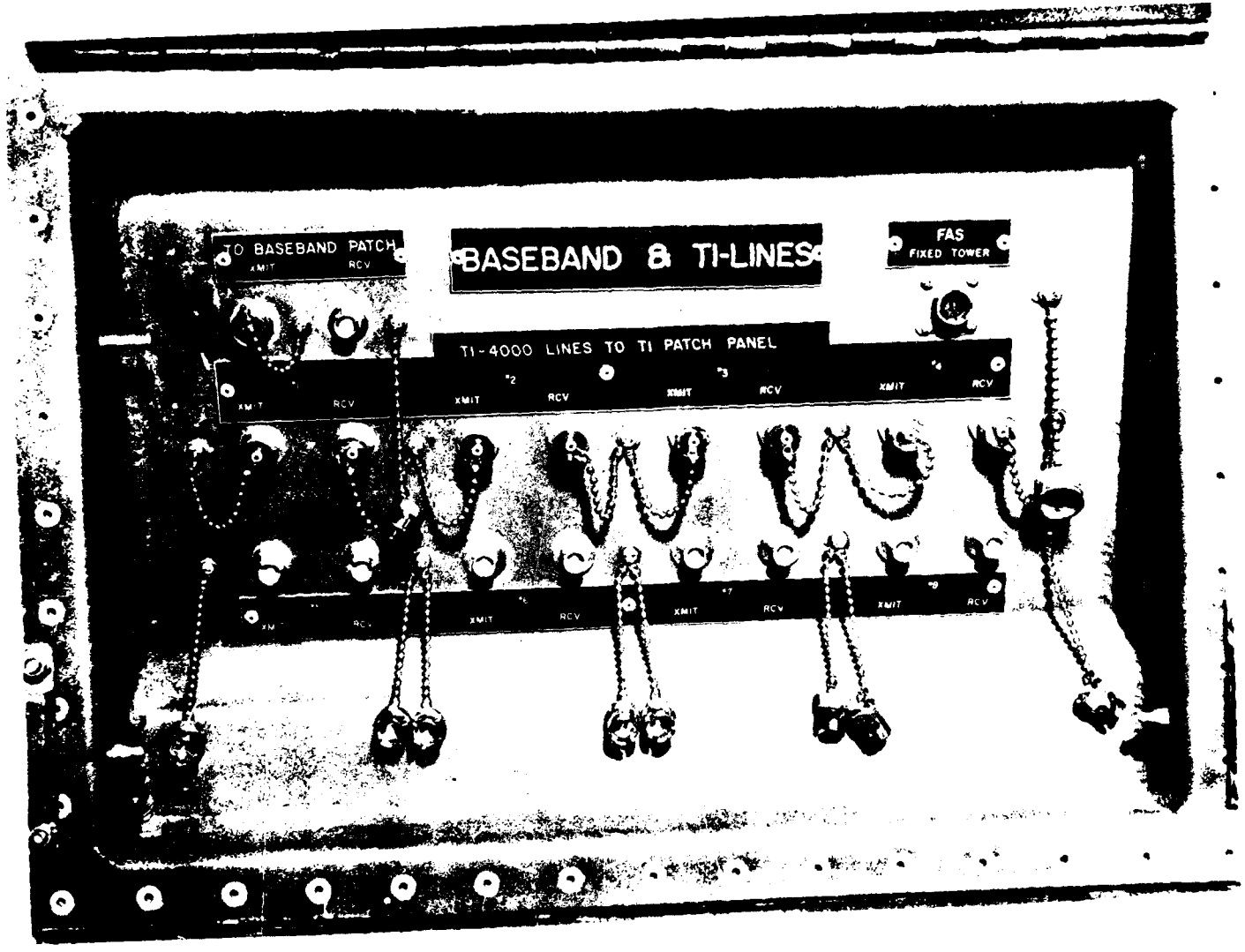
Equipment Shelter (Right side)



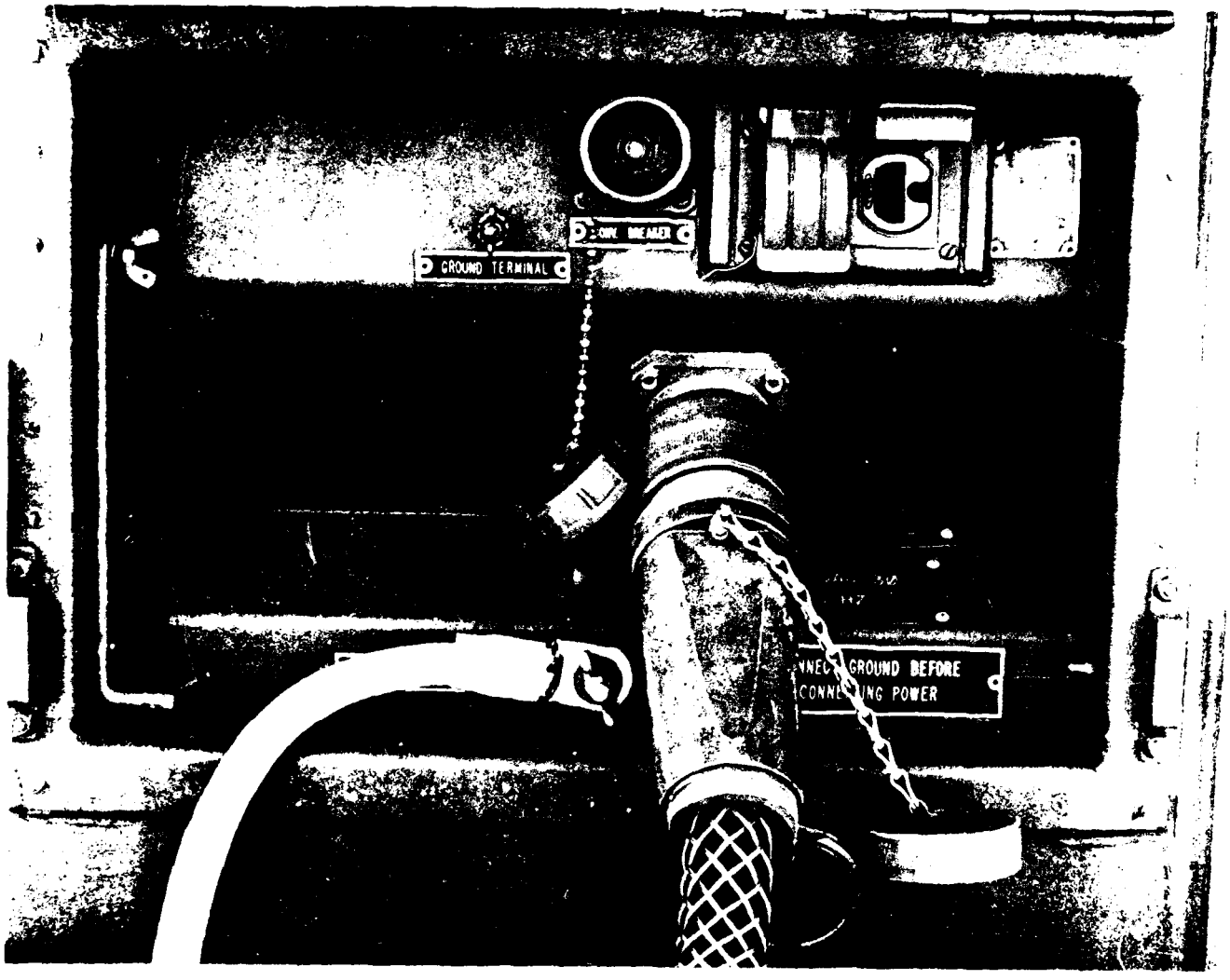
Equipment Shelter (Rear)



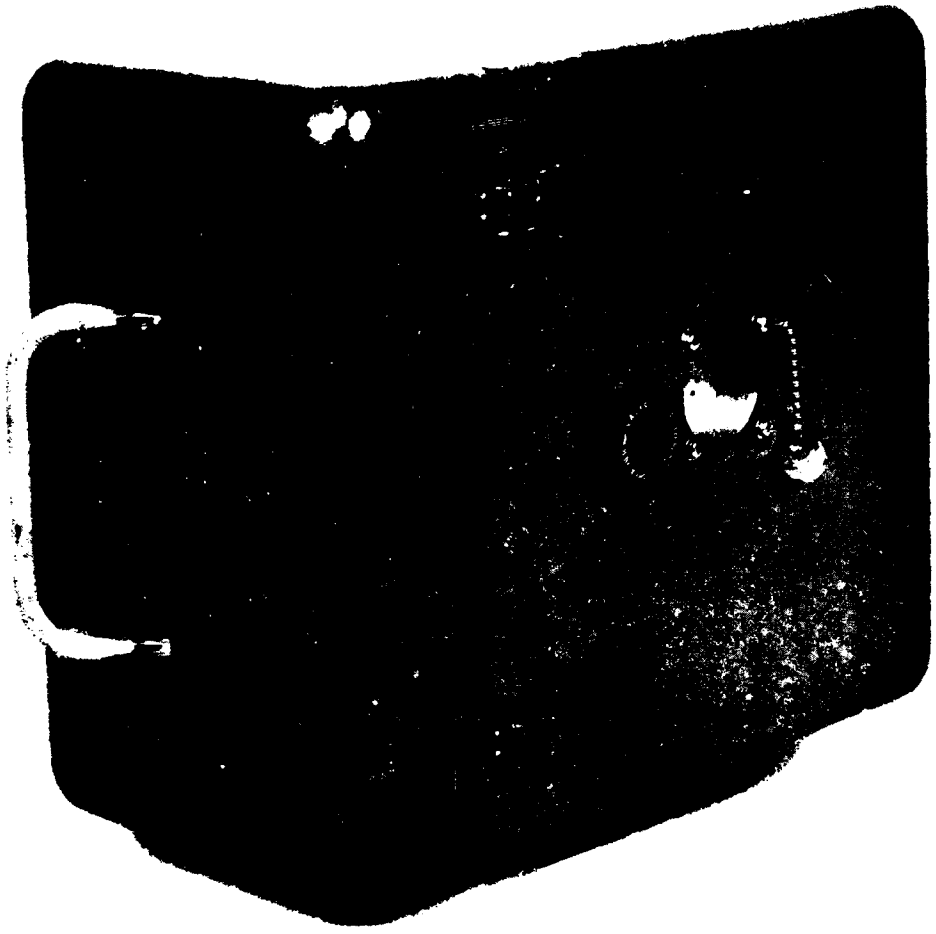
VF Entry Panel



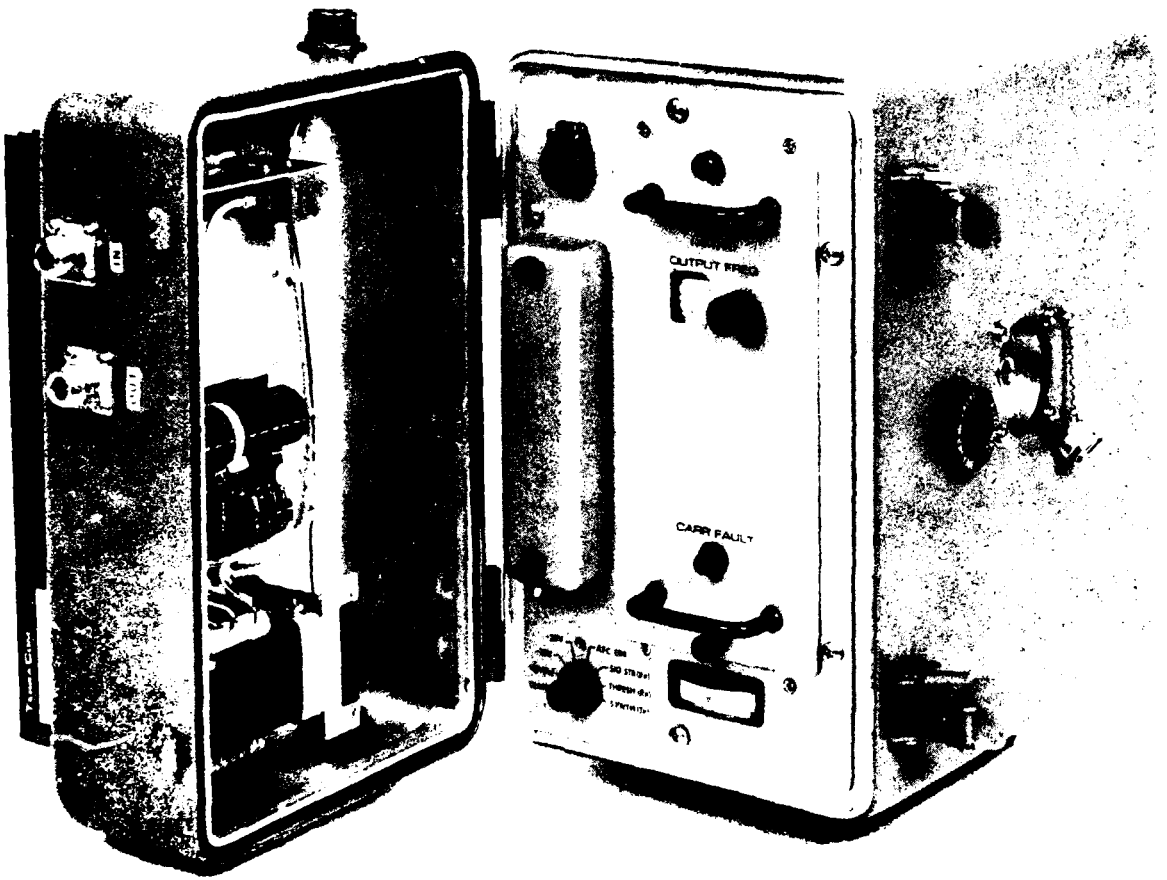
Baseband and T1 Entry Panel



Power Entry Panel



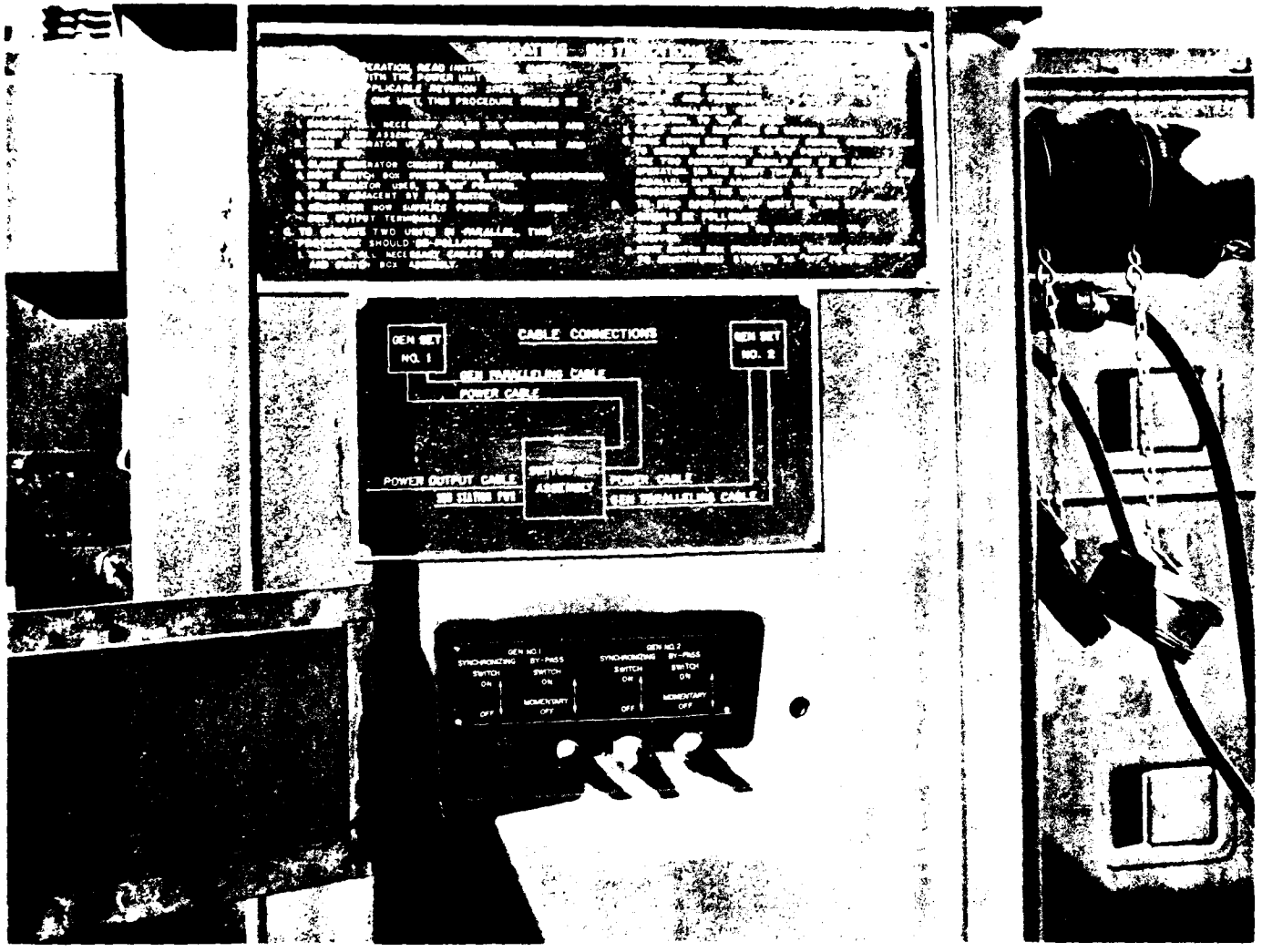
Remote Box (Typical)



Remote Box w/Type IA Amplifier

Equipment Shelter (Entrance view)

Generators



Generator Switch Box Assembly (Synchronizer)

APPENDIX B

TYPE I A (AN/GSC-47) EXHIBIT

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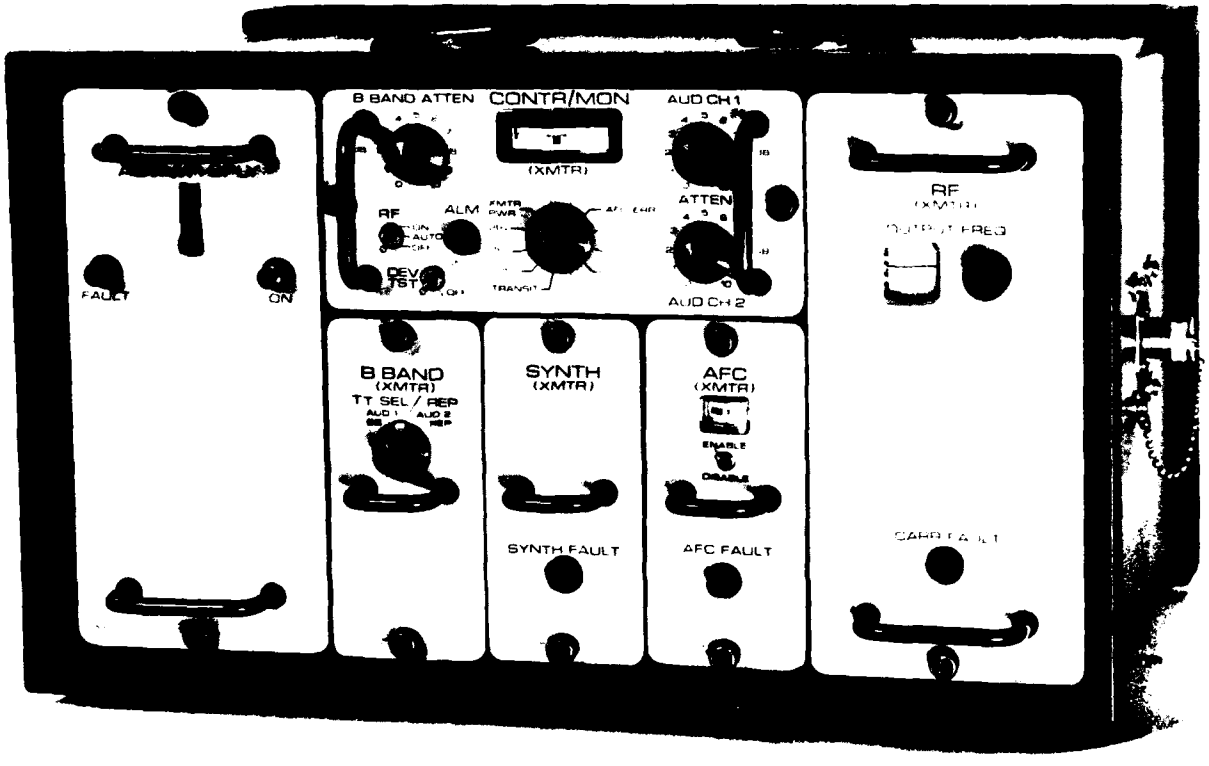
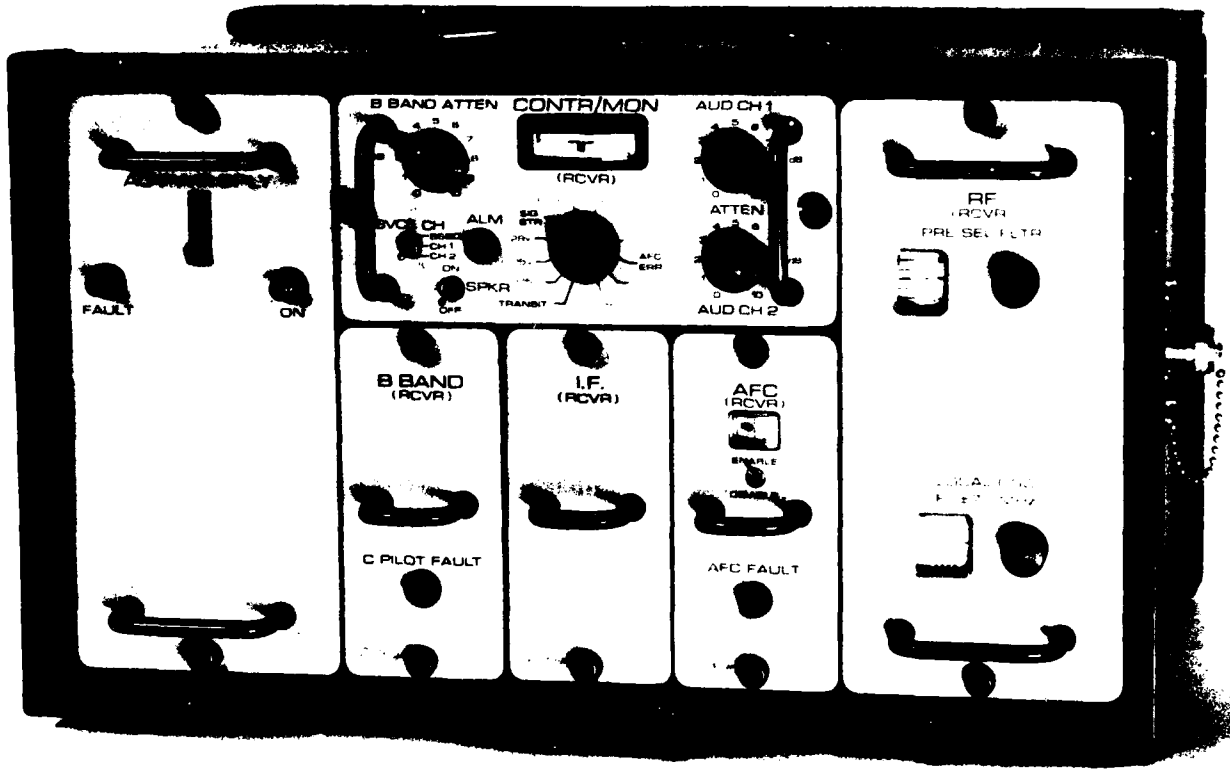
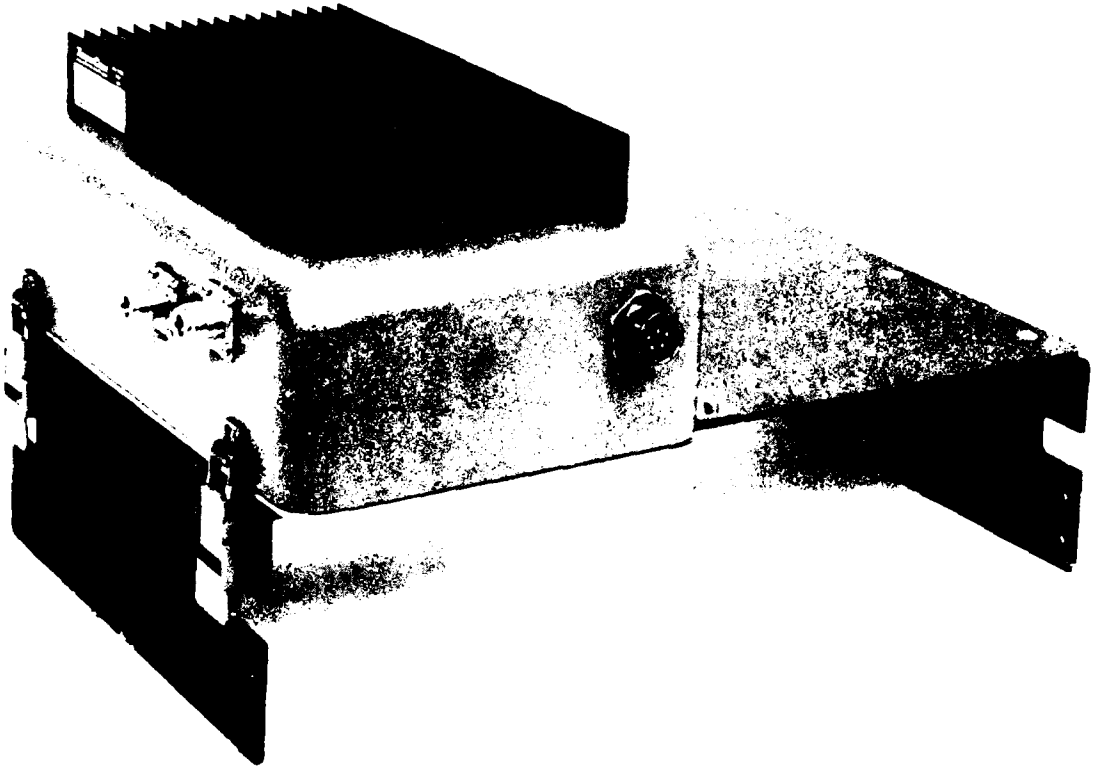


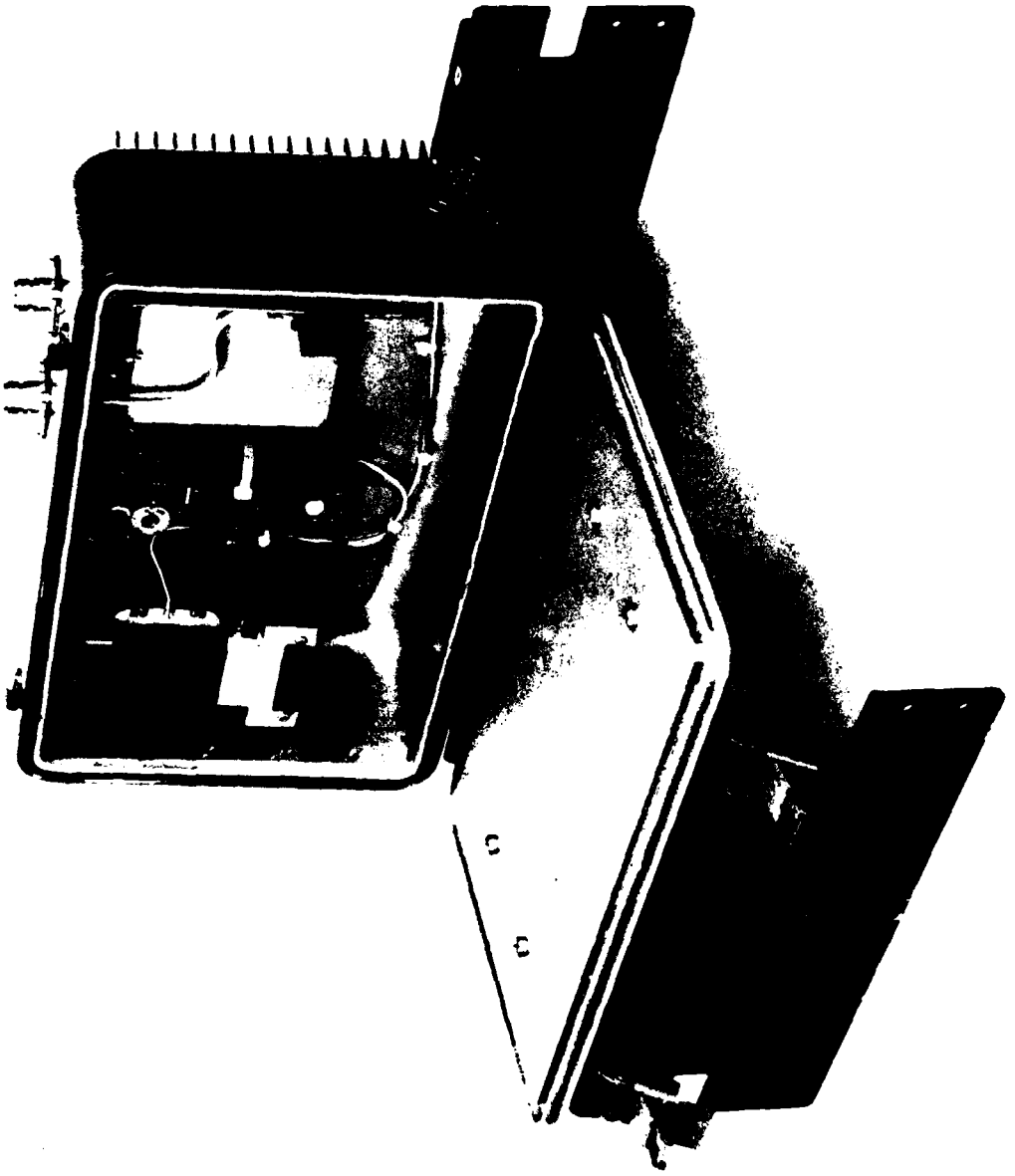
Radio Transmitter (Typical)



Radio Receiver (Typical)



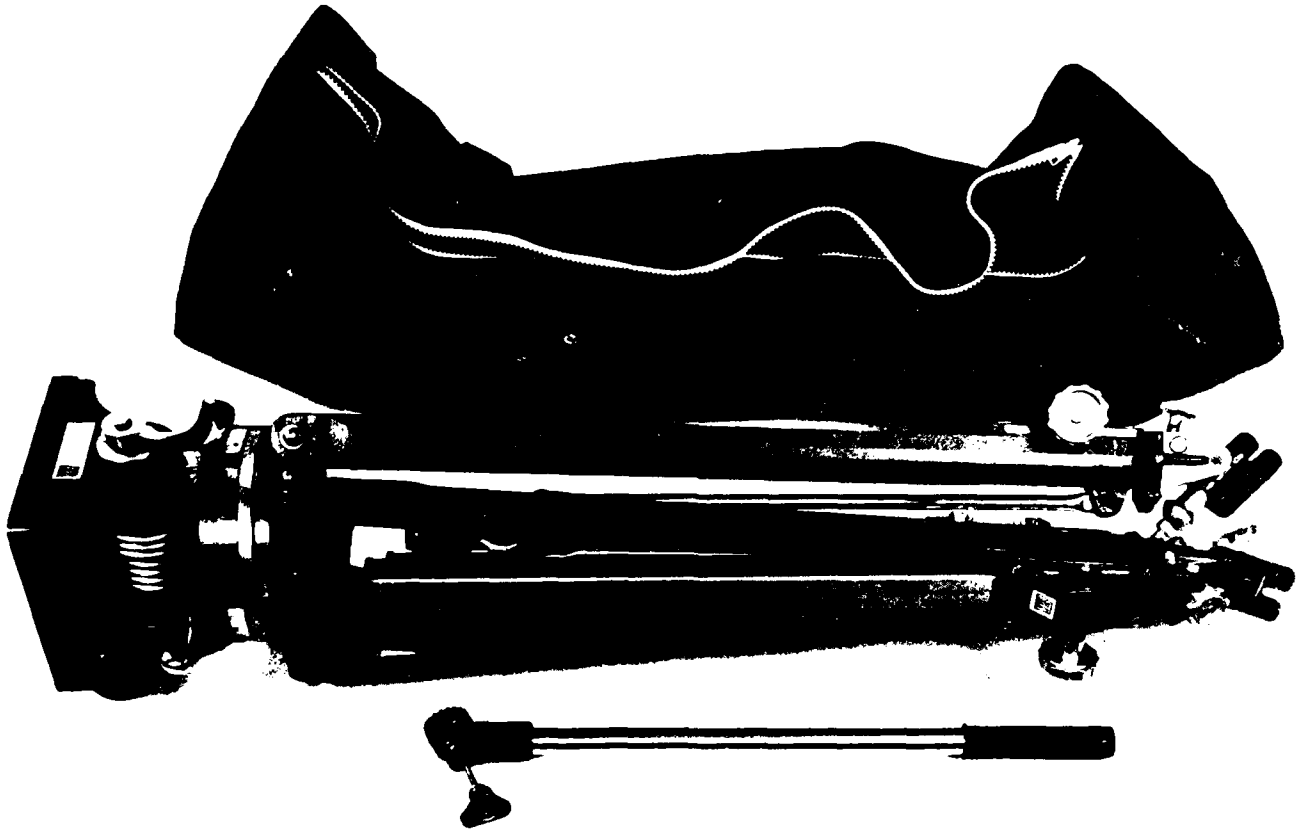
Solid State Amplifier



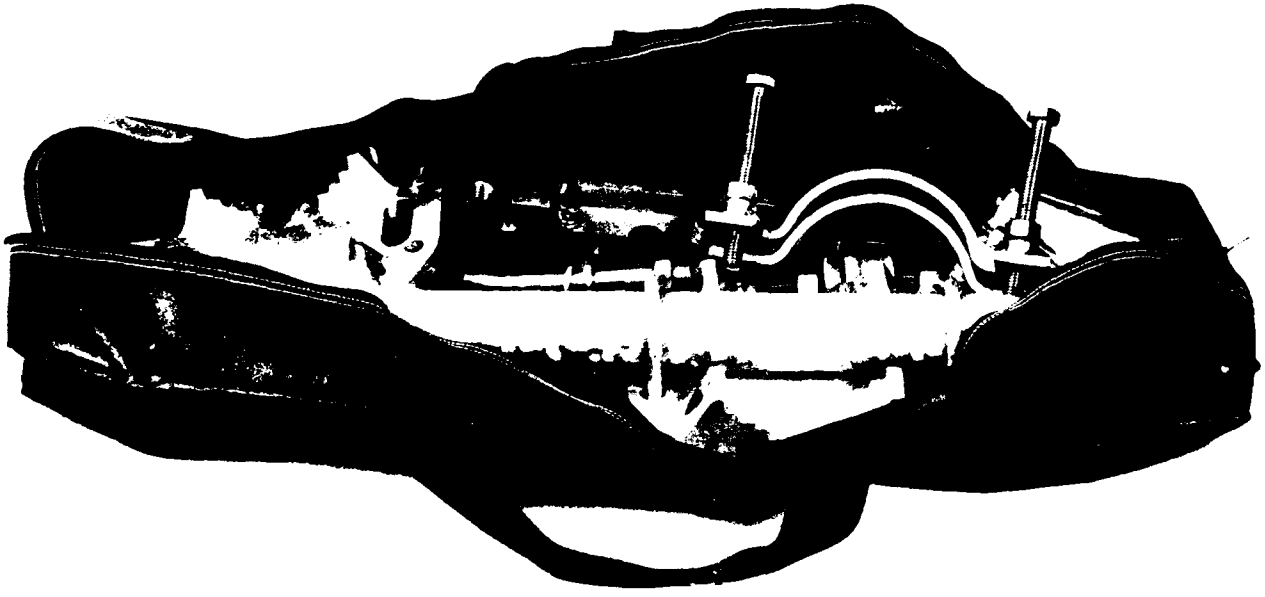
Solid State Amplifier (Open)

Tripod Mounted (1/2 Type IA)

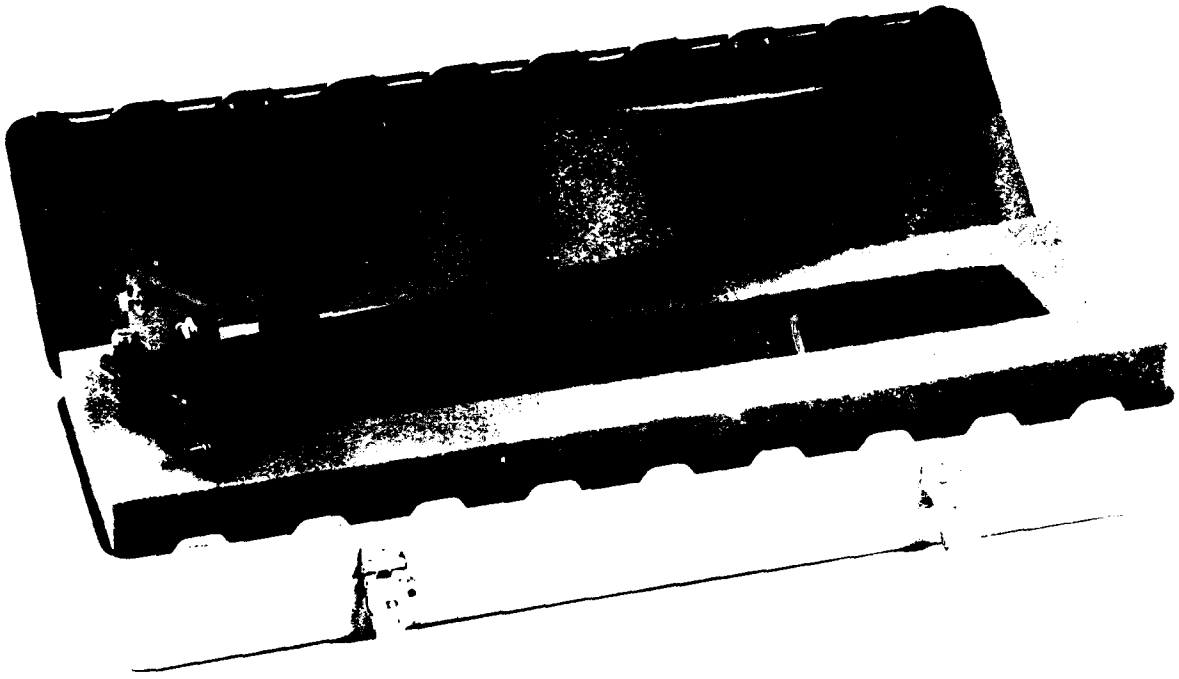
Tripod Mounted w/Radome (1/2 Type IA)



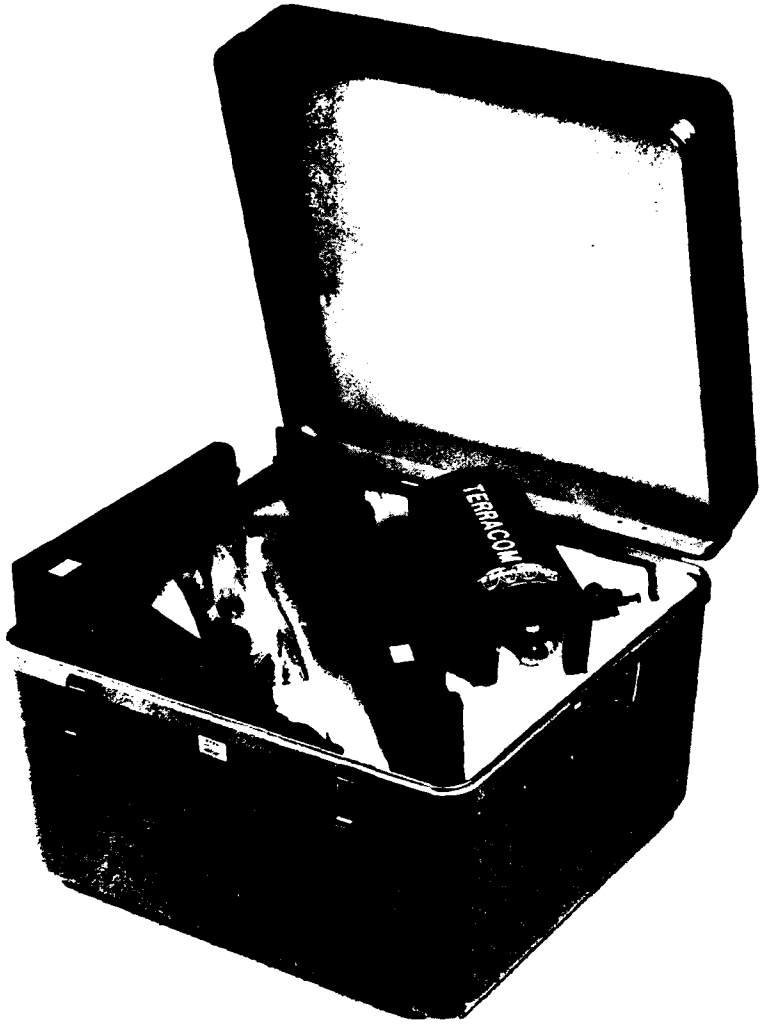
Tripod



Pipemount



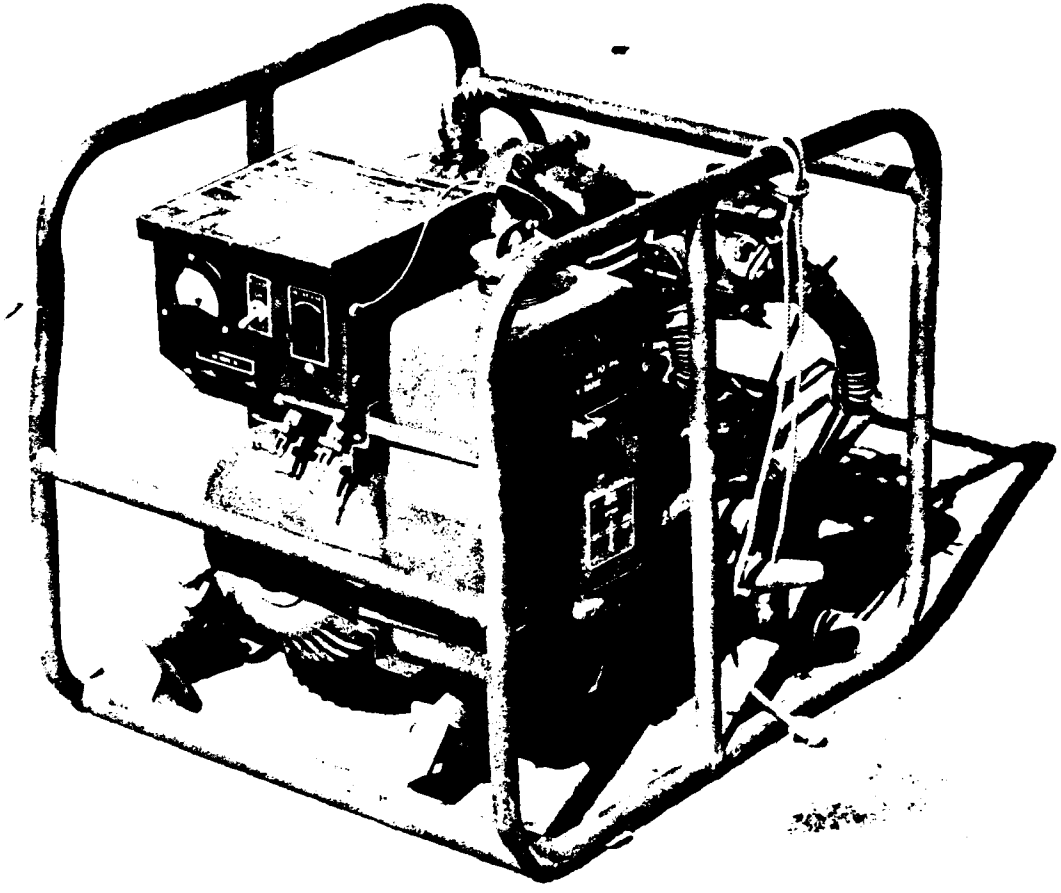
Feedhorn



Accessories w/Carrying Case


DEB TYPE 1-A ORDERWIRE
THE MITRE
REMOTE ALARM
DEB TYPE 1—A ORDERWIRE
THE MITRE

Orderwire



Generator (Typical)

END

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